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EPA Utility FGD (Flue Gas Desulfurization) Survey: April-June 1980

PEDCo-Environmental, Inc.
Cincinnati, OH

Prepared for

Industrial Environmental Research Lab.
Cincinnati, OH

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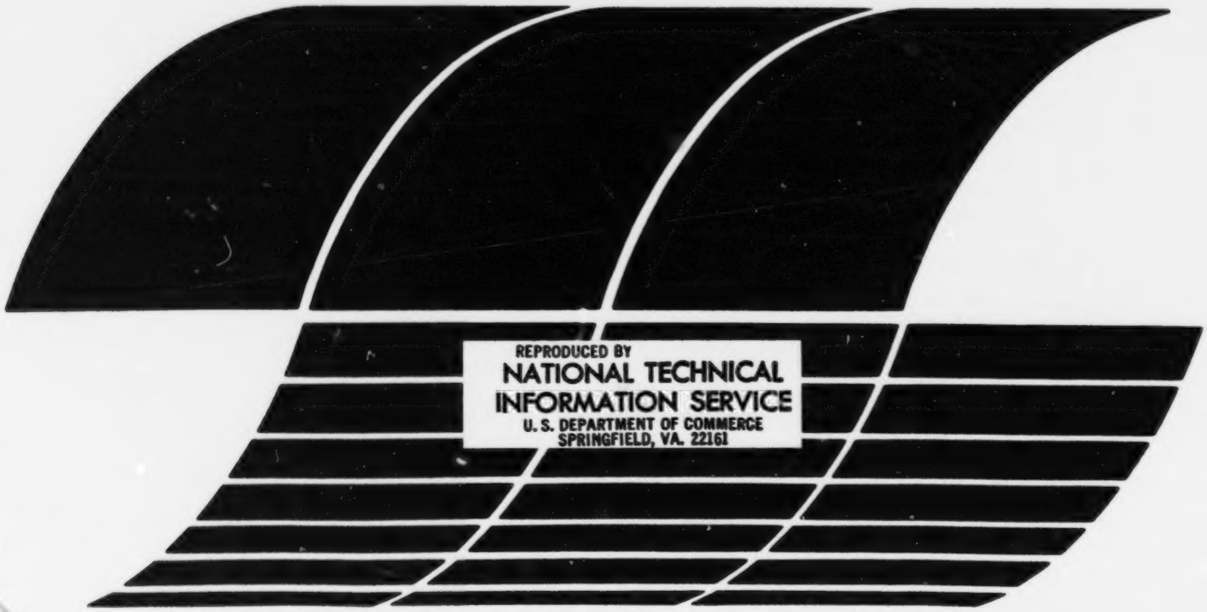

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16. ABSTRACT

This report is the second of three supplements updating the October-December 1979 report (EPA-600/7-80-029a) and should be used in conjunction with it. The report, which is generated by a computerized data base system, presents a survey of operational and planned domestic utility flue gas desulfurization (FGD) systems, operational domestic particle scrubbers, and Japanese coal-fired utility boiler FGD installations. It summarizes information contributed by the utility industry, process suppliers, regulatory agencies, and consulting engineering firms. Domestic FGD systems are tabulated alphabetically by development status (operational, under construction, or in planning stages), utility company, process supplier, process, and waste disposal practice. It presents data on boiler design, FGD system design, fuel characteristics, and actual performance. It includes unit by unit dependability parameters and discusses problems and solutions associated with the boilers and FGD systems. Process flow diagrams and FGD system economic data are appended.

17. KEY WORDS AND DOCUMENT ANALYSIS

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Pollution	Maintenance	Pollution Control	13B
Flue Gases		Stationary Sources	21B
Desulfurization		Utility Boilers	07A, 07D
Electric Utilities			
Waste Disposal			15E
Boilers			13A

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April-June 1980

by

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1B

NOTICE

This report (prepared by PEDCo Environmental, Inc., Cincinnati, Ohio under EPA Contract No. 68-01-4147, Task No. 143) is provided as an information transfer document. Data in this report are supplied voluntarily by utility representatives; flue gas desulfurization (FGD) system designers and suppliers; regulatory personnel; and others. Neither EPA nor the designated contractor warrants the accuracy or completeness of information contained in this report.

Initial distribution of the report (generally one copy per company) is limited to organizations and individuals indicating a specific interest in the field of FGD technology. Additional copies of this report and succeeding issues can be purchased from National Technical Information Service, Springfield, Virginia 22151.

This report presents a summary of the FGD system design and performance data stored in the Flue Gas Desulfurization Information System (FGDIS), a computerized data base from which it is generated. Plans are currently being formulated to allow access to the FGDIS by private users (subject to the limitations expressed in the first paragraph above). It is anticipated that this will be implemented during the third quarter, 1980, at which time the service will be available to the public through the National Technical Information Service for a usage charge (nonprofit). Users will have the capability to access the additional design and performance data stored within the data base that cannot be conveniently printed in this report. In addition, users will be able to tabulate the data in a manner consistent with their specific information needs, as well as perform statistical analyses of the numerical data (e.g., average liquid to gas ratio for limestone FGD systems). When this service becomes available, the current recipients of this report will be notified; and classes will be provided on the use of the system.

USE OF THIS REPORT

This report is the second of three supplementary issues to the October - December 1979 report. Supplementary issues are cumulative, so that it is necessary to retain only the latest issue and the October - December 1979 report (EPA-600/7-80-029a).

It should be noted that along with the design and performance data for operational FGD systems contained in Section 3, this report also contains a number of tables presenting tabulations of some of the key data. The Executive Summary contains the number and capacity of FGD systems as of the end of June 1980, future projections (December 1990) of controlled and uncontrolled generating capacity, and unit by unit summaries of status changes and performance during the period.

Recent additions to this report include a section containing design and performance data for U.S. operational particle scrubbers (Section 14) and a section containing design and performance data for coal-fired operational Japanese FGD systems (Section 15). The regulatory classifications were recently modified to accomodate the revised New Source Performance Standards (6/79) and, as a result, the categories will differ slightly from those of previous issues.

Appended to this report is a section containing reported and adjusted cost data for U.S. FGD systems in which operational systems are stressed (Appendix A). Also included in the appendices are definitions, a table of unit notation, and FGD process flow diagrams.

ABSTRACT

This report is the second of three supplements updating the October - December 1979 report (EPA-600/7-80-029a) and should be used in conjunction with it. The report, which is generated by a computerized data base system, presents a survey of operational and planned domestic utility flue gas desulfurization (FGD) systems, operational domestic particle scrubbers, and Japanese coal-fired utility boiler FGD installations. It summarizes information contributed by the utility industry, process suppliers, regulatory agencies, and consulting engineering firms. It presents data on system design, fuel characteristics, operating history and actual performance. Unit by unit dependability parameters are included and problems and solutions associated with the boilers, scrubbers, and FGD systems are discussed.

The domestic FGD systems are tabulated alphabetically by development status (operational, under construction, or in the planning stages), utility company, system supplier, process, waste disposal practice, and regulatory class. FGD system economic data, definitions, and a glossary of terms are appended to the report. Current data for operational domestic FGD systems show 73 systems in operation, 38 systems under construction, and 89 planned systems. Projected 1990 FGD controlled capacity in the U.S. is 95,223 MW.

CONTENTS

Page

Notice ii
Use of This Report iii
Abstract iv
Tables x
Executive Summary and Highlights xi

Section 1 Summary List of FGD Systems 1

Section 2 Status of FGD Systems 8

Section 3 Design and Performance Data for Operational FGD Systems 42

Alabama Electric
  Tombigbee 2 42
  Tombigbee 3 44
Arizona Electric Power
  Apache 2 46
  Apache 3 48
Arizona Public Service
  Cholla 1 50
  Cholla 2 52
  Four Corners 1 53
  Four Corners 2 54
  Four Corners 3 55
Big Rivers Electric
  Green 1 56
Central Illinois Light
  Duck Creek 1 58
Central Illinois Public Service
  Newton 1 61
Colorado Ute Electric Assn.
  Craig 2 63
Columbus & Southern Ohio Electric
  Conesville 5 65
  Conesville 6 67
Commonwealth Edison
  Powerton 51 69
Cooperative Power Association
  Coal Creek 1 72

CONTENTS (continued)

Page

Delmarva Power & Light
  Delaware City 1 74
  Delaware City 2 77
  Delaware City 3 80
Duquesne Light
  Elrama 1-4 83
  Phillips 1-6 85
Indianapolis Power & Light
  Petersburg 3 88
Kansas City Power & Light
  Hawthorn 3 90
  Hawthorn 4 92
  LaCygne 1 94
Kansas Power & Light
  Jeffrey 1 96
  Jeffrey 2 97
  Lawrence 4 99
  Lawrence 5 101
Kentucky Utilities
  Green River 1-3 103
Louisville Gas & Electric
  Cane Run 4 104
  Cane Run 5 106
  Cane Run 6 108
  Mill Creek 3 110
  Paddy's Run 6 112
Minnesota Power & Light
  Clay Boswell 4 114
Minnkota Power Cooperative
  Milton R. Young 2 118
Monongahela Power
  Pleasants 1 121
Montana Power
  Colstrip 1 122
  Colstrip 2 123
Nevada Power
  Reid Gardner 1 124
  Reid Gardner 2 126
  Reid Gardner 3 128
Northern Indiana Public Service
  Dean H. Mitchell 11 130
Northern States Power
  Sherburne 1 132
  Sherburne 2 134
Pacific Power & Light
  Jim Bridger 4 136

CONTENTS (continued)

		Page
	Pennsylvania Power	
	Bruce Mansfield 1	138
	Bruce Mansfield 2	140
	Bruce Mansfield 3	142
	Public Service Company of New Mexico	
	San Juan 1	144
	San Juan 2	146
	San Juan 3	148
	Salt River Project	
	Coronado 1	150
	South Carolina Public Service Authority	
	Winyah 2	151
	Winyah 3	153
	South Mississippi Electric	
	R.D. Morrow 1	155
	R.D. Morrow 2	157
	Southern Illinois Power Coop	
	Marion 4	159
	Southern Indiana Gas & Electric	
	A.B. Brown 1	161
	Springfield City Utilities	
	Southwest 1	163
	St. Joe Zinc	
	G.F. Weaton 1	165
	Tennessee Valley Authority	
	Shawnee 10A	167
	Shawnee 10B	168
	Widows Creek 8	170
	Texas Utilities	
	Martin Lake 1	172
	Martin Lake 2	174
	Martin Lake 3	176
	Monticello 3	178
	Utah Power & Light	
	Hunter 1	179
	Hunter 2	181
	Huntington 1	183
Section 4	Summary of FGD Systems by Company	185
Section 5	Summary of FGD Systems by System Supplier	187
Section 6	Summary of FGD Systems by Process	189
Section 7	Summary of Operating FGD Systems by Process and Unit	190

CONTENTS (continued)

Page

Section 8 Summary of End-Product Disposal Practices for Operational FGD Systems 192

Section 9 Summary of FGD Systems in Operation 194

Section 10 Summary of FGD Systems Under Construction 198

Section 11 Summary of Contract Awarded FGD Systems 200

Section 12 Summary of Planned FGD Systems 202

Section 13 Total FGD Units and Capacity (MW) Installed by Year 205

Section 14 Design and Performance Data for Operational Particle Scrubbers 206

Commonwealth Edison
  Will County 1 206
Detroit Edison
  St. Clair 6 209
Minnesota Power and Light
  Aurora 1 211
  Aurora 2 213
  Clay Boswell 3 215
Montana-Dakota Utilities
  Lewis & Clark 1 217
Pacific Power and Light
  Dave Johnston 4 219
Potomac Electric Power
  Dickerson 1 220
  Dickerson 2 221
  Dickerson 3 223
Public Service of Colorado
  Arapahoe 4 224
  Cherokee 1 226
  Cherokee 4 228
  Valmont 5 230
Southwestern Public Service
  Harrington 1 232

Section 15 Design and Performance Data for Operational Foreign FGD Systems 234

Chugoku Electric
  Shimonoseki 1 234

CONTENTS (continued)

		Page
	Electric Power Development Company	
	Isogo 1	236
	Isogo 2	238
	Takasago 1	240
	Takasago 2	242
	Takehara 1	244
Appendix A	FGD System Cost Data: Operational and Nonoperational Systems	A-1
	Introduction	A-2
	Approach	A-4
	Description of Cost Elements	A-7
	Definition of Cost Elements	A-15
	Costs for Operational FGD Systems	A-20
	Costs for Nonoperational FGD Systems	A-25
Appendix B	Definitions	B-1
Appendix C	Table of Unit Notation	C-1
Appendix D	FGD Process Flow Diagrams	D-1

TABLES

No.		Page
I	Number and Total Capacity of FGD Systems	xi
II	Summary of Changes, April - June 1980	xiii
III	Performance of Operational Units, April - June 1980	xv

FIGURE

No.		Page
1	Computerized Data Base Structure Diagram	xii

EXECUTIVE SUMMARY

This report is prepared quarterly (every three months) by PEDCo Environmental, Inc., under contract to the Industrial Environmental Research Laboratory/Research Triangle Park and the Division of Stationary Source Enforcement of the U.S. Environmental Protection Agency. It is generated by a computerized data base system, the structure of which is illustrated in Figure 1.

Table I summarizes the status of FGD systems in the United States at the end of June 1980. Table II lists the units that have changed status during the second quarter 1980, and Table III shows the performance of operating units during this period.

TABLE I. NUMBER AND TOTAL CAPACITY OF FGD SYSTEMS

Status	No. of units	Total controlled capacity, MW*	Equivalent scrubbed capacity, MW†
Operational	73	27,155	24,765
Under construction	38	17,525	16,524
Planned:			
Contract awarded	29	13,769	12,919
Letter of intent	7	5,590	5,590
Requesting/evaluating bids	15	8,424	8,424
Considering only FGD systems	38	22,760	22,540
TOTAL	200	95,223	90,762

* Total Controlled Capacity (TCC) is the summation of the gross unit capacities (MW) brought into compliance with FGD systems regardless of the percent of the flue gas scrubbed by the FGD system(s).

† Equivalent Scrubbed Capacity (ESC) is the summation of the effective scrubbed flue gas in equivalent MW based on the percent of flue gas scrubbed by the FGD system(s).

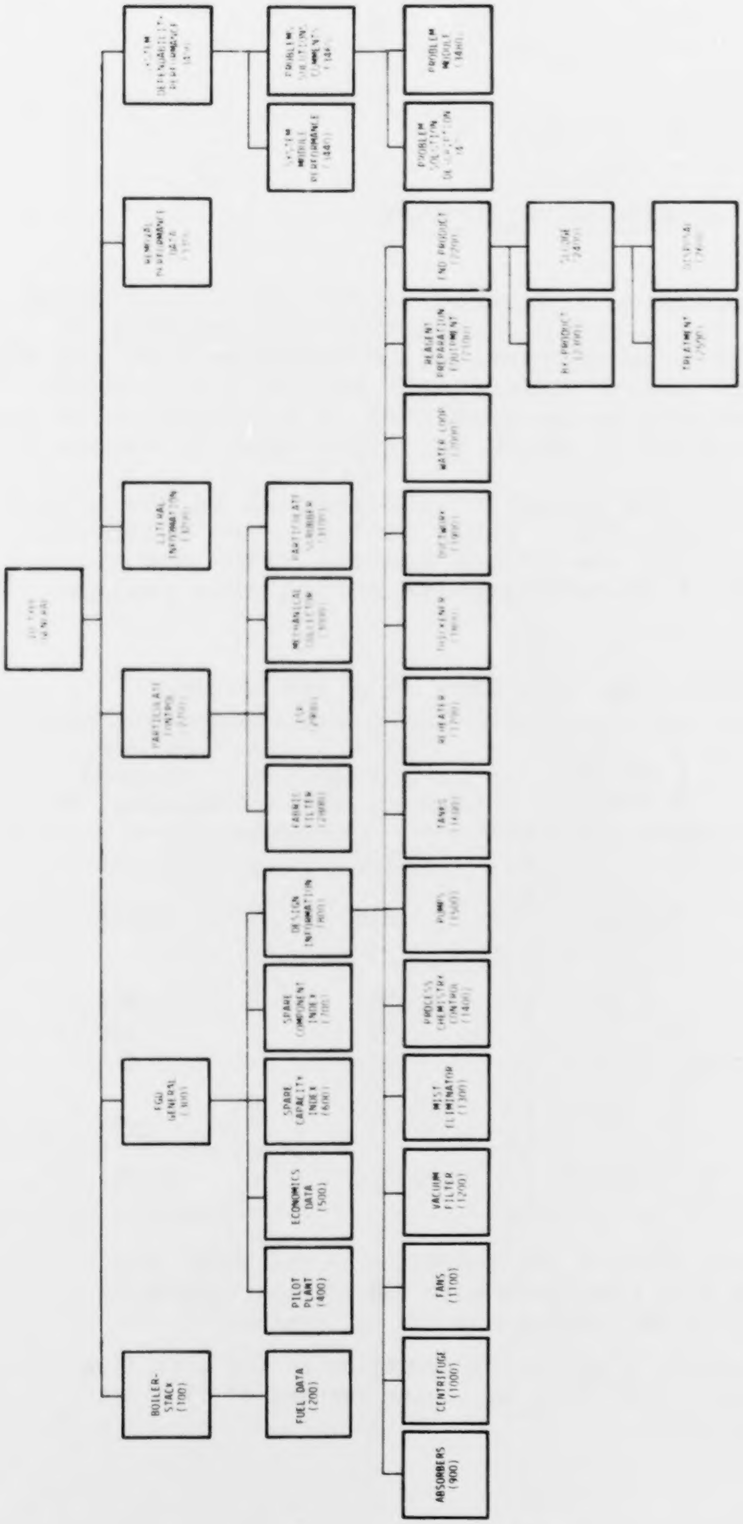

Figure 1. Computerized data base structure diagram.

TABLE II. SUMMARY OF CHANGES
APRIL - JUNE 1980

FGD status report	Operational		Under construction		Contract awarded		Letter of intent		Requesting/ eval. bids		Considering FGD		Total	
	No.	MW[a]	No.	MW[a]	No.	MW[a]	No.	MW[a]	No.	MW[a]	No.	MW[a]	No.	MW[a]
March 31, 1980	65	21,733[b]	42	18,343[b]	23	10,513[b]	2	842	15	10,345[b]	34	19,212[b]	181	80,938[b]
Cajun Electric Power Coop.														
Big Cajun 3											+1	540	+1	540
Colorado UTE Electric Assn.														
Craig 3					+1	447					-1	447		
Commonwealth Edison														
Powerton 51	+1	450	-1	450										
Delmarva Power & Light														
Delaware City 1	+1	60	-1	60										
Delaware City 2	+1	60											+1	60
Delaware City 3	+1	60											+1	60
General Public Utilities														
Coal 4											+1	625	+1	625
Coho 1									+1	690	-1	690		
Seward 7									+1	690	-1	690		
Hoosier Energy														
Merom 1			+1	441	-1	441								
Houston Lighting & Power														
W.A. Parish 8			+1	492	-1	492								
Limestone 1									+1	750			+1	750
Limestone 2									+1	750			+1	750
Iowa Electric Light & Pwr.														
Guthrie Co. 1									+1	720			+1	720
Jacksonville Elect. Authority														
New Project 1											+1	600	+1	600
New Project 2											+1	600	+1	600
Kansas Power & Light														
Jeffrey 2	+1	490	-1	490										
Lansing Board of Water & Light														
Erickson 2											+1	160	+1	160
Los Angeles Dept. of Wtr. & Pwr.														
Intermountain 1											+1	820	+1	820
Intermountain 2											+1	820	+1	820
Intermountain 3											+1	820	+1	820
Intermountain 4											+1	820	+1	820
Marquette Board of Light & Pwr.														
Shiras 3									+1	44			+1	44
Middle South Utilities														
Arkansas Lignite 1							+1	890	-1	890				
Arkansas Lignite 2							+1	890	-1	890				
Unassigned 1							+1	890	-1	890				
Unassigned 2							+1	890	-1	890				
Wilton 1							+1	890	-1	890				
Wilton 2							+1	890	-1	890				

(Continued)

TABLE II (Continued)

	Operational		Under construction		Contract awarded		Letter of intent		Requesting/ eval. bids		Considering FGD		Total	
FGD status report	No.	MW[a]	No.	MW[a]	No.	MW[a]	No.	MW[a]	No.	MW[a]	No.	MW[a]	No.	MW[a]
Minnesota Power & Light														
Clay Boswell 4	+1	475	-1	475										
Nebraska Public Power District														
Fossil III 1											+1	650	+1	650
Nevada Power														
Reid Gardner 4							+1	250	-1	250				
Warner Valley 1									+1	250	-1	250		
Warner Valley 2									+1	250	-1	250		
Northern Indiana Pub. Service														
Schahfer 17					+1	421	-1	421						
Schahfer 18					+1	421	-1	421						
Pennsylvania Power														
Bruce Mansfield 3	+1	917	-1	917										
Philadelphia Electric														
Eddystone 1A	-1	120											-1	120
Plains Electric G&T Coop.														
Plains Escalante 1					+1	233							+1	233
Platte River Power Authority														
Rawhide 1					+1	275							+1	275
Potomac Electric Power														
Dickerson 4											-1	800	-1	800
South Carolina Public Service														
Cross 1					+1	500							+1	500
Cross 2					+1	500							+1	500
Winyah 3	+1	280	-1	280										
Winyah 4			+1	280	-1	280								
Sunflower Electric Coop.														
Holcomb 1					+1	347							+1	347
Tampa Electric														
Big Bend 4					+1	475			-1	475				
Utah Power & Light														
Hunter 2	+1	360	-1	360										
TOTAL	73	24,765	38	16,524	29	12,919	7	5,590	15	8,424	38	22,540	200	90,762

[a] Equivalent scrubbed capacity.

[b] This value was modified slightly due to a MW correction.

TABLE III. PERFORMANCE OF OPERATIONAL UNITS
APRIL - JUNE 1980

Plant	FGD system capacity, MW[a]	Flue gas % scrubbed	FGD capacity on line during period, MW[a,b]	No information for this period, MW[a]	Shut down throughout period, MW[a]	April 1980 Dependability %[c,e]				May 1980 Dependability %[c,e]				June 1980 Dependability %[c,e]			
						AVL	OPR	REL	UTL	AVL	OPR	REL	UTL	AVL	OPR	REL	UTL
Tombigbee 2	179	70	179			100	98		97	100	97	97	97				
Tombigbee 3	179	70	179						0	96	8	8	1				
Apache 2	97	49	97			67	65	65	61	91	91	91	91				
Apache 3	97	49	97			99	97	97	31	0	0		0				
Cholla 1	119	100		119													
Cholla 2	264	100		264													
Four Corners 1	175	100		175													
Four Corners 2	175	100		175													
Four Corners 3	229	100		229													
Green 1	242	100	242			65	56	79	45	74	76	79	74				
Duck Creek 1	416	100	416			48	73	89	48	42	65	70	42	85	80	84	80
Newton 1	617	100	617			33	29	29	29	5	5	5	3	20	20	20	20
Craig 2	447	100	447							40	38	40	40	53	57	59	53
Conesville 5	411	100	411			85	75		70	91	85		85	86	73		73
Conesville 6	411	100	411			99	40		17	97	46		43	97	62		62
Powerton 51	450	100	450														
Coal Creek 1	327	60	327			99	83	100	31	88	51	100	25	90	53	100	53
Delaware City 1	60	100	60														
Delaware City 2	60	100	60														
Delaware City 3	60	100	60														
Elrama 1-4	510	100	510			99	99	100	99	100	99	100	99				
Phillips 1-6	408	100	408			97	73	76	73	83	68	80	68				
Petersburg 3	532	100		532													
Hawthorn 3	90	100	90						68				60				66
Hawthorn 4	90	100	90						65				90				98
La Cygne 1	874	100	874			96	82	93	54	96	88	96	83				
Jeffrey 1	540	75	540			100	100	100	100	100	100	100	100	100	100	100	100
Jeffrey 2	490	70	490							100	100	100	100	100	100	100	100
Lawrence 4	125	100	125			100	100	100	80	100	100	100	100	100	100	100	100
Lawrence 5	420	100	420			100	100	100	100	100	100	100	81	100	100	100	100
Green River 1-3	64	100			64	100			0	100			0	100			0
Cane Run 4	188	100	188			99	99	99	80	97	100	100	7	0	0	0	0
Cane Run 5	200	100	200			0	0	0	0	95	95	95	80	79	74	74	62
Cane Run 6	299	100	299			99	92	98	74	100	100	100	100	100	100	100	89
Mill Creek 3	442	100	442			43	43	43	42	68	51	51	34	88	0	0	0
Paddy's Run 6	72	100	72			100	0	0	0	100	87	87	8	100	94	94	7

(Continued)

TABLE III (Continued)

Plant	FGD system capacity, MW[a]	Flue gas % scrubbed	FGD capacity on line during period, MW[a,b]	No information for this period, MW[a]	Shut down throughout period, MW[a]	April 1980 Dependability %[c,e]				May 1980 Dependability %[c,e]				June 1980 Dependability %[c,e]			
						AVL	OPR	REL	UTL	AVL	OPR	REL	UTL	AVL	OPR	REL	UTL
Clay Boswell 4	475	85	475														
Milton R. Young 2	185	42	185			0	0	0	0	47	48	51	46	42	40	41	39
Pleasants 1	618	100		618													
Colstrip 1	360	100		360													
Colstrip 2	360	100		360													
Reid Gardner 1	125	100	125			97	97	97	81	98	94	97	85	93	93	93	89
Reid Gardner 2	125	100	125			99	99	99	94	93	86	68	14	100	98	100	75
Reid Gardner 3	125	100	125			100			0	0	0	0	0	75	81	81	72
Dean H. Mitchell 11	115	100	115			63	53	53	50	63	24	26	16	53	0	0	0
Sherburne 1	740	100	740			97				96				96			
Sherburne 2	740	100	740			96				96				100			
Jim Bridger 4	550	100	550			26	25	28	20	89	68	88	63				
Bruce Mansfield 1	917	100		917													
Bruce Mansfield 2	917	100		917													
Bruce Mansfield 3	917	100		917													
San Juan 1	361	100	361			100	75	100	51	100	96	100	86	91	87	80	71
San Juan 2	350	100	350			81	74	80	55	99	95	100	85	69	58	53	48
San Juan 3	534	100	534														
Coronado 1	280	80		280													
Winyah 2	140	50	140			100	100	100	85	96	95	95	78	100	100	100	100
Winyah 3	280	100	280			64	60	60	50								
R.D. Morrow 1	124	62	124			100	99	100	99	100	100	100	89	99	97	99	93
R.D. Morrow 2	124	62	124			0			0	2	14	14	2	99	90	99	78
Marion 4	184	100		184													
A.B. Brown 1	265	100	265			100	98	100	94	100	100	100	83	100	100	100	98
Southwest 1	194	100	194			47	38	38	33	58	46	52	46	49	46	47	46
G.F. Weaton 1	60	N/A[d]	60														
Shawnee 10A	10	N/A[d]		10													
Shawnee 10B	10	N/A[d]		10													
Widows Creek 8	550	100	550			96	81		46	97	80		60	100	75	100	68
Martin Lake 1	595	75	595														
Martin Lake 2	595	75	595														
Martin Lake 3	595	75	595														
Monticello 3	800	100	800														

(Continued)

TABLE III (Continued)

Plant	FGD system capacity, MW[a]	Flue gas % scrubbed	FGD capacity on line during period, MW[a,b]	No information for this period, MW[a]	Shut down throughout period, MW[a]	April 1980 Dependability %[c,e]				May 1980 Dependability %[c,e]				June 1980 Dependability %[c,e]			
						AVL	OPR	REL	UTL	AVL	OPR	REL	UTL	AVL	OPR	REL	UTL
Hunter 1	360	90	360				100		60		100		64		100		98
Hunter 2	360	90	360														
Huntington 1	366	85	366				98		92		100		100		100		99
TOTAL			18,364	6,067	64												

[a] Equivalent scrubbed capacity.

[b] This category includes the flue gas capacity being handled by the FGD system at least part of the time during the report period.

[c] The percent figures listed are average values for all system scrubbing trains during the period.

[d] Flue gas % scrubbed for prototype and demonstration units is not applicable unless the system is designed to bring a unit into compliance with SO_2 emission standard.

[e] Availability, operability, reliability, and utilization as defined in Appendix C of this report.

As indicated in Table I, 73 power generating units (all coal-fired) are now equipped with operating FGD systems. These units represent a total controlled capacity of 27,155 MW. Current projections indicate that the total power generating capacity of the U.S. electric utility industry will be approximately 833 GW by the end of 1990.[a] (This value reflects the annual loss resulting from the retirement of older units, which is considered to be 0.4 percent of the average generating capacity at the end of each year.[b]) Approximately 370 GW or 44 percent of the 1990 total will come from coal-fired units. The distribution of power generation sources, both present (December 1979) and future (December 1990) is as follows:[a]

	Coal	Nuclear	Oil	Hydro	Gas	Other	GW (total)
December 1979	39%	9%	25%	13%	13%	1%	603
December 1990	44%	14%	20%	11%	10%	1%	833

Based on the known commitments to FGD by utilities as presented in Table I, the percentage of electrical generating capacity controlled by FGD for both the present (June 1980) and the future (December 1990) is as follows:

	Coal-fired generating capacity, %	Total generating capacity, %
June 1980*	11.5	4.5
December 1990	26.0	11.4

In light of the revised New Source Performance Standards, actual FGD control is expected to be greater than what is reflected by the figures above. For example, about 40 to 50 systems representing approximately 20,000 to 25,000 MW of generating capacity presently fall into the uncommitted category. These are systems that cannot be included in the committed group at this time because information regarding their status is not ready for public release.

In an effort to show general FGD usage and projected usage trends, the table below gives a current (June 1980) and a projected (December 1990) breakdown of throwaway product systems versus saleable product systems as a percent of the total known commitments to FGD as of the end of the second quarter 1980:

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* The number of committed FGD systems is as of June 1980; however, the figure used for the total generating capacity and coal-fired generating capacity is based on the available December 1979 figures.

	Percent of total MW	
	June 1980	December 1990
Throwaway product process		
Wet systems		
Lime	39.8	23.0
Limestone	45.1	37.9
Dual alkali	4.8	2.2
Other[a]	3.8	7.9
Dry systems		
Lime	-	3.3
Aqueous carbonate	-	0.5
Saleable product process		
Byproduct		
Gypsum	-	0.7
Sulfur	3.6	1.0
Sulfuric acid	2.9	3.0
N/A[b]	-	1.8
Process Undecided	-	18.7
Total	100.0	100.0

[a] The other category contains some systems that will produce a throwaway product, but the actual process is unknown at this time.

[b] N/A - not available (these systems will utilize a saleable product process but the byproduct is unknown at this time).

HIGHLIGHTS: APRIL - JUNE 1980

The following paragraphs highlight FGD system developments during the second quarter, 1980.

Cajun Electric Power Cooperative has announced plans to construct Big Cajun 3, unit 1 in De Soto Parish, Louisiana. The unit will be rated at 540 MW (gross) and has a scheduled start up date of 1985. The utility is currently considering a dry scrubbing system as an SO_2 emission control strategy.

A contract was awarded during the second quarter 1980 to Babcock & Wilcox by Colorado UTE Electric Association for the installation of a lime/spray drying FGD system to control SO_2 emissions from the new Craig 3 unit. This unit will be rated at 447 MW (gross) and will fire subbituminous coal with an average sulfur content of 0.45%. Initial operations are expected to begin in 1982.

Initial operations of the limestone FGD system retrofitted on the 450 MW (gross) Powerton 51 unit of Commonwealth Edison began during April. This system, which was supplied by the Air Correction Division of UOP, consists of three turbulent contact absorber modules preceeded by a common ESP for primary particulate matter removal. An indirect hot air reheater boosts the temperature of the cleaned flue gas before it exits through a 450 foot stack. As of the end of June, only two of the three absorber modules had been placed in operation.

Delmarva Power & Light announced that initial operations of the Wellman Lord FGD systems retrofitted on the Delaware City station boilers 1, 2, and 3 began in May. The FGD systems, which were supplied by Davy McKee, each consist of a four stage tray tower design. Primary particulate matter removal is provided by a mechanical collector and a venturi type particle scrubber which preceed each absorber train. The utility reports that no major operational problems have been encountered during start up of the systems.

General Public Utilities has announced plans for a new unit, currently being identified as Coal 4, which will be rated at 625 MW (gross). Although the exact location has not yet been determined, the unit will be either in Pennsylvania or New Jersey. The utility is currently considering only FGD as a means to control SO_2 emissions. The scheduled start up date for this unit is 1997.

General Public Utilities began requesting/evaluating bids for FGD systems to be installed for SO_2 emission control on the new Coho 1 and Seward 7 units. Each unit will be rated at 690 MW (gross). Coho 1 will be located in Erie, Pennsylvania and Seward 7 will be located in Seward, Pennsylvania. The projected start up dates for the two units are May, 1991 for Coho 1 and May 1987 for Seward 7.

Construction began during the second quarter 1980 on the limestone FGD system being installed by Mitsubishi Heavy Industries on the 490 MW (gross) Merom 1 unit of Hoosier Energy. The FGD system, which consists of a grid tower design, will be preceeded by an ESP for primary particulate matter control. A bypass reheat system will be included to boost the temperature of the flue gas before it exits through a 700 foot stack. Initial start up of the system is projected for May 1982.

Houston Lighting & Power has begun requesting/evaluating bids for wet limestone FGD systems to be installed at its planned Limestone County facility. There will be two coal (1.08% S) fired 750 MW (gross) boilers with a separate FGD system for control of SO_2 emissions. A cold side ESP will be used for control of particulate matter emissions. The scheduled start up dates are 1985 for unit 1 and 1986 for unit 2.

During the second quarter 1980 construction began on the limestone FGD system being installed to control SO_2 emissions from the 600 MW (gross) W. A. Parish 8 unit of Houston Lighting & Power. This system, which is being supplied by Chemico, will consist of a spray tower design preceeded by Research Cottrell fabric filters for primary particulate matter removal. A bypass reheat system will be included to boost the temperature of the flue gas before exiting through a 500 foot brick lined stack. This unit is scheduled to begin initial operations in November, 1982.

Iowa Electric Light & Power is currently evaluating bids for an FGD system to be installed at the Guthrie County 1 station. The unit is to be located in Pandora, Iowa and rated at 720 MW (gross). Only wet limestone FGD systems are being evaluated. The projected start up date is December, 1984.

Jacksonville Electric Authority has announced plans for two new units, currently being identified as New Project 1 and New Project 2, to be constructed in East Port, Florida. The units will be rated at 600 MW (gross). A wet limestone scrubbing system is currently under consideration as the SO_2 emission control strategy. The projected start up for units 1 and 2 is 1985 and 1987, respectively.

Kansas Power & Light reported that commercial operation of the FGD system installed on the 700 MW (gross) Jeffrey 2 unit began in May. The FGD system was supplied by Combuston Engineering and utilizes a wet limestone process. The system design consists of spray towers preceeded by a cold side ESP for primary particulate matter removal. A 30% flue gas bypass reheat system boosts the temperature of the flue gas before it exits through a 600 foot stack. The utility reports that no major operational problems have been encountered since system start up.

Lansing Board of Light & Water has announced plans to build a second unit at its Erickson Station. The unit will have a rating of between 160 and 250 MW (gross), depending on how many other municipal utilities join in the project. Start up is projected for 1987. The utility is currently considering only FGD as a means to control SO_2 emissions at this unit.

Los Angeles Department of Water & Power has announced plans for four new units, Intermountain 1-4. This is a joint venture with Southern California Edison and will be called the Intermountain Power Project. The plant will be located in Delta, Utah. These units will be rated at 820 MW (gross) each and will fire a low sulfur Utah coal. Weir type horizontal wet scrubbers along with hot side ESP's are currently under consideration for emission control. The first unit is scheduled to come on line in 1986 and the following units will come on line yearly thereafter.

Bids for a dry lime scrubbing system are currently being requested by the Marquette (Michigan) Board of Light & Power. This FGD system will be installed on unit 3 of the Shiras generating facility. The unit has a rating of 44 MW (gross) and will fire a low sulfur coal. A fabric filter will be used for particulate matter control. Projected start up of this unit is 1982.

Middle South Utilities has announced that a letter of intent has been signed with Combustion Engineering for the installation of FGD systems to control SO_2 emissions from each of their six planned 890 MW (gross) units. These units are currently known as Arkansas Lignite 1 & 2, Unassigned 1 & 2, and Wilton 1 & 2. Although precise locations for these units have not yet been decided, it is known that Arkansas Lignite will be in the state of Arkansas and Wilton will be in the state of Louisiana. The projected start up dates for Arkansas Lignite 1 & 2 are January, 1986 and January, 1988, respectively, and the projected start up dates for Wilton 1 & 2 are also January, 1986 and January, 1988, respectively. Unassigned 1 & 2 are scheduled to commence operations in January, 1985 and January, 1987, respectively.

Initial FGD operations began during April 1980 at the Clay Boswell 4 unit of Minnesota Power & Light. This unit is rated at 554 MW (gross) and burns subbituminous coal with an average sulfur content of 0.94%. The FGD system was supplied by Peabody Process Systems and utilizes a lime/alkaline flyash process with a spray tower configuration. Two ESP's and four (one spare) particle scrubbers upstream of the FGD system provide primary particulate matter removal. A chevron mist eliminator is included downstream of each absorber and the FGD system waste product is disposed of in a lined pond one mile from the plant site. Although operating parameters are not yet available for this unit, the utility reports that the system has operated well with only normal shakedown problems being encountered.

Nebraska Public Power District is currently considering a dry scrubbing system for its Fossill III unit, which is to be located near Sargent, Nebraska. The planned 650 MW (gross) unit will fire a low sulfur subbituminous coal. The projected start up is in 1987.

Nevada Power reported that the Reid Gardner 1 FGD system had availabilities of 97%, 98%, and 93% for the months of April, May, and June, respectively. Some minor outages occurred during the period; however, no major operational problems were reported. The Reid Gardner 2 FGD system had availabilities of 99%, 93%, and 100% for the months of April, May, and June, respectively. Minor problems were reported with plugging of the venturi nozzles during the period. The Reid Gardner 3 FGD system did not operate during the months of April and May for FGD system induced draft fan repairs. It returned to service in June.

Nevada Power reported that a letter of intent was signed during the second quarter, 1980 for a wet sodium carbonate system to be installed on the planned Reid Gardner 4 unit. This unit, which will be rated at 250 MW (gross), will burn coal with an average sulfur content of 0.75%. Initial start up is scheduled for April, 1983.

Nevada Power also reported that they are currently requesting/ evaluating bids for FGD systems to be installed on the planned Warner Valley 1 & 2 units. Each unit will be rated at 295 MW (gross) and will burn coal with an average sulfur content of 1.15%. Initial start up of units 1 & 2 is scheduled for June, 1985 and June, 1986, respectively.

Northern Indiana Public Service announced that a contract has been awarded to FMC for the installation of dual alkali FGD systems at the Schahfer 17 & 18 units. The boilers, which will be located in Wheatfield, Indiana, will fire bituminous coal having an average sulfur content of 3.2% and will each be rated at 421 MW (gross). Each FGD system will consist of four modules and will utilize an ESP for primary particulate matter control. Operations at Schahfer 17 & 18 are scheduled to commence in 1983 and 1985, respectively.

Northern States Power reported availabilities of 97%, 96%, and 96% for the months of April, May, and June, respectively, for the Sherburne 1 FGD system. No major operational problems were reported for the period. The Sherburne 2 FGD system was out of service during most of May and June as a result of an annual boiler and turbine inspection. The FGD system availabilities were 96%, 96%, and 100% for April, May, and June, respectively.

Initial operations of the FGD system at the Bruce Mansfield 3 unit began in June, 1980. This system, which was supplied by Pullman Kellogg and utilizes a lime process, treats the flue gas from a 917 MW (gross) boiler that burns coal with an average sulfur content of 3.0%. Included in the emission control system are four ESP's for primary particulate matter removal and direct combustion reheaters to boost the temperature of the flue gas before it exits through a 600 foot stack. The FGD system is currently in the shakedown/debugging phase of operation.

Plains Electric Generation & Transmission Cooperative has awarded a contract to Combustion Engineering for a wet limestone scrubbing system that will be installed on unit 1 at the Plains Escalante Generating Station. The unit will be rated at 233 MW (gross) and particulate matter control will be achieved with a fabric filter. Start up is scheduled for 1983.

A contract has been awarded to Joy Manufacturing/Niro Atomizer by Platte River Power Authority for a dry lime scrubbing system. The

FGD system will be installed on the Rawhide 1 unit which is being built in Ft. Collins, Colorado. The unit is rated at 279 MW (gross) and will fire a low sulfur western coal.

Potomac Electric Power announced during the second quarter, 1980 that plans for the 850 MW (gross) Dickerson 4 unit have been cancelled. The utility reports that the demand for power has been lower than anticipated and they feel that an oil fired unit near completion at the Chalk Point station will be adequate to meet present demands.

South Carolina Public Service has awarded a contract with Peabody Process Systems for wet limestone FGD systems to be installed at the Cross Generating Station. Two 500 MW (gross) coal fired boilers are planned for location in Cross, S.C. The projected start up dates are 1986 for unit 1 and 1984 for unit 2.

South Carolina Public Service also announced during the April - June 1980 period that initial FGD operations at the Winyah 3 unit began in May. This unit is rated at 280 MW (gross) and burns coal with an average sulfur content of 1.7%. The FGD system, which is preceeded by an ESP for primary particulate matter removal, was supplied by Babcock & Wilcox and utilizes a limestone process. The utility reports that some damper problems have been encountered during the initial start up period.

Construction began during April, 1980 on the limestone FGD system being supplied by American Air Filter for the Winyah 4 unit of South Carolina Public Service. This unit will also be rated at 280 MW (gross) and will burn coal with an average sulfur content of 1.7%. The FGD system will consist of two spray towers preceded by an ESP for primary particulate matter removal. The projected start up date is July, 1981.

Southern Indiana Gas & Electric reported that the A.B. Brown 1 FGD system acheived availabilities of 100% for all three months of the second quarter, 1980. No FGD system forced outages were encountered during the three month period.

Sunflower Electric Coop has awarded a contract to Joy Manufacturing/Niro Atomizer for a dry lime scrubbing system to be installed on the planned Holcomb 1. The unit will be rated at 347 MW (gross) and is to be located in Holcomb, Kansas. Particulate matter control will be achieved with a fabric filter. The unit is scheduled to commence operations in the fall of 1983.

A contract was awarded during the second quarter 1980 to Research Cottrell for the installation of a lime/limestone FGD system at the Big Bend 4 unit of Tampa Electric. This new unit will be rated at 475 MW (gross) and will burn coal with an average sulfur content of 2.35%. The FGD system will be preceded by an ESP for primary particulate matter removal and an indirect hot air reheat system will be included to boost the temperature of the flue gas before it exits through a 490 foot stack. The projected initial start up date for the system is December, 1984.

Initial operation of the Lime FGD system installed on the Hunter 2 unit of Utah Power & Light began during June, 1980. The FGD system was supplied by Chemico and treats flue gas from a 400 MW (gross) boiler that burns coal with an average sulfur content of 0.55%. An ESP upstream of the FGD system provides primary particulate matter removal, while a bypass system provides stack gas reheat. The waste product is stabilized with flyash before being disposed of on-site. Actual performance data characterizing initial operations of this system are not yet available.

REFERENCES

a. U.S. Department of Energy. Energy Information Administration. Office of Coal and Electric Power Statistics. Electric Power Statistics Division. Inventory of Power Plants in the United States, December 1979. Publ. No. DOE/EIA-0095 (79).

b. Rittenhouse, R.C. New Generating Capacity: When, Where, and by Whom. Power Engineering 82(4):57. April 1978.

SECTION 1
SUMMARY LIST OF FGD SYSTEMS

COMPANY NAME/ UNIT NAME	UNIT NO.	UNIT LOCATION		START-UP DATE	STATUS	REG CLASS
ALABAMA ELECTRIC COOP						
TOMBIGBEE	2	LEROY	ALABAMA	9/78	1	B
TOMBIGBEE	3	LEROY	ALABAMA	6/79	1	B
ARIZONA ELECTRIC POWER COOP						
APACHE	2	COCHISE	ARIZONA	8/78	1	D
APACHE	3	COCHISE	ARIZONA	6/79	1	D
ARIZONA PUBLIC SERVICE						
CHOLLA	1	JOSEPH CITY	ARIZONA	10/73	1	C
CHOLLA	2	JOSEPH CITY	ARIZONA	4/78	1	C
CHOLLA	4	JOSEPH CITY	ARIZONA	6/81	2	C
FOUR CORNERS	1	FARMINGTON	NEW MEXICO	11/79	1	C
FOUR CORNERS	2	FARMINGTON	NEW MEXICO	11/79	1	C
FOUR CORNERS	3	FARMINGTON	NEW MEXICO	11/79	1	C
FOUR CORNERS	4	FARMINGTON	NEW MEXICO	0/82	3	C
FOUR CORNERS	5	FARMINGTON	NEW MEXICO	0/82	3	C
ASSOCIATED ELECTRIC COOP						
THOMAS HILL	3	MOBERLY	MISSOURI	1/82	2	A
BASIN ELECTRIC POWER COOP						
ANTELOPE VALLEY	1	BEULAH	NORTH DAKOTA	4/83	2	D
ANTELOPE VALLEY	2	BEULAH	NORTH DAKOTA	10/85	5	C
LARAMIE RIVER	1	WHEATLAND	WYOMING	7/80	2	C
LARAMIE RIVER	2	WHEATLAND	WYOMING	6/81	2	C
LARAMIE RIVER	3	WHEATLAND	WYOMING	4/82	2	C
BIG RIVERS ELECTRIC						
D. B. WILSON	1			11/84	6	A
D. B. WILSON	2			0/85	6	A
GREEN	1	SEBREE	KENTUCKY	12/79	1	B
GREEN	2	SEBREE	KENTUCKY	11/80	2	B
CAJUN ELECTRIC POWER COOP						
BIG CAJUN 3	1	DE SOTO PARISH	LOUISIANA	0/85	6	A
CENTRAL ILLINOIS LIGHT						
DUCK CREEK	1	CANTON	ILLINOIS	7/76	1	B
DUCK CREEK	2	CANTON	ILLINOIS	1/86	5	A
CENTRAL ILLINOIS PUBLIC SERV						
NEWTON	1	NEWTON	ILLINOIS	9/79	1	B
CENTRAL MAINE POWER						
SEARS ISLAND	1	PENOBSCOT BAY	MAINE	1/89	6	A
CINCINNATI GAS & ELECTRIC						
EAST BEND	1	RABBITHASH	KENTUCKY	0/ [illegible]	6	
EAST BEND	2	RABBITHASH	KENTUCKY	9/80	2	B
COLORADO UTE ELECTRIC ASSN.						
CRAIG	1	CRAIG	COLORADO	7/80	2	D
CRAIG	2	CRAIG	COLORADO	12/79	1	D
CRAIG	3	CRAIG	COLORADO	0/82	3	D
COLUMBUS & SOUTHERN OHIO ELEC.						
CONESVILLE	5	CONESVILLE	OHIO	1/77	1	D
CONESVILLE	6	CONESVILLE	OHIO	6/78	1	D
POSTON	5	NELSONVILLE	OHIO	8/86	6	D
POSTON	6	NELSONVILLE	OHIO	0/89	6	D

1. OPERATIONAL UNITS
2. UNITS UNDER CONSTRUCTION
3. PLANNED - CONTRACT AWARDED
4. PLANNED - LETTER OF INTENT SIGNED
5. PLANNED - REQUESTING/EVALUATING BIDS
6. PLANNED - CONSIDERING ONLY FGD SYSTEMS
7. PLANNED - CONSIDERING FGD SYSTEMS; ALSO ALTERNATIVE METHODS

A. FEDERAL NSPS(6/79)
B. FEDERAL NSPS(12/71)
C. STANDARD(S) MORE STRINGENT THAN NSPS(6/79)
D. STANDARD(S) MORE STRINGENT THAN NSPS(12/71) BUT NOT MORE STRINGENT THAN NSPS(6/79)
E. STANDARD(S) EQUAL TO OR LESS STRINGENT THAN NSPS(12/71)

SECTION 1
SUMMARY LIST OF FGD SYSTEMS

COMPANY NAME/ UNIT NAME	UNIT NO.	UNIT LOCATION		START-UP DATE	STATUS	REG CLASS
COMMONWEALTH EDISON						
POWERTON	51	PEKIN	ILLINOIS	4/80	1	E
COOPERATIVE POWER ASSOCIATION						
COAL CREEK	1	UNDERWOOD	NORTH DAKOTA	8/79	1	B
COAL CREEK	2	UNDERWOOD	NORTH DAKOTA	7/80	2	B
DELMARVA POWER & LIGHT						
DELAWARE CITY	1	DELAWARE CITY	DELAWARE	5/80	1	E
DELAWARE CITY	2	DELAWARE CITY	DELAWARE	5/80	1	E
DELAWARE CITY	3	DELAWARE CITY	DELAWARE	5/80	1	E
VIENNA	9	VIENNA	MARYLAND	6/87	6	A
DESERET GEN & TRANS COOP						
MOON LAKE	1	VERNAL	UTAH	9/84	5	A
MOON LAKE	2	VERNAL	UTAH	0/88	5	A
DUQUESNE LIGHT						
ELRAMA	1-4	ELRAMA	PENNSYLVANIA	10/75	1	D
PHILLIPS	1-6	SOUTH HEIGHT	PENNSYLVANIA	7/73	1	D
EAST KENTUCKY POWER COOP						
J. K. SMITH	1			1/85	6	A
J. K. SMITH	2			1/87	6	A
SPURLOCK	2	MAYSVILLE	KENTUCKY	1/81	2	B
FLORIDA POWER & LIGHT						
MARTIN	3	MARTIN COUNTY	FLORIDA	0/87	7	A
MARTIN	4	MARTIN COUNTY	FLORIDA	0/89	7	A
GENERAL PUBLIC UTILITIES						
COAL	1	UNDECIDED	UNDECIDED	12/92	6	A
COAL	2	UNDECIDED	UNDECIDED	5/94	6	A
COAL	3	UNDECIDED	UNDECIDED	12/95	6	A
COAL	4	UNDECIDED	UNDECIDED	5/97	6	A
COHO	1	GIRARD TWP.	PENNSYLVANIA	5/91	5	A
SEWARD	7	E. WHEATFIELD	PENNSYLVANIA	5/87	5	A
GRAND HAVEN BRD OF LIGHT & PWR						
J. B. SIMS	3	GRAND HAVEN	MICHIGAN	6/83	3	A
HOOSIER ENERGY						
MEROM	1	SULLIVAN	INDIANA	5/82	2	B
MEROM	2	SULLIVAN	INDIANA	7/81	2	B
HOUSTON LIGHTING & POWER						
LIMESTONE	1	JEWITT	TEXAS	2/85	5	A
LIMESTONE	2	JEWITT	TEXAS	2/86	5	A
W.A. PARISH	8	BOOTH	TEXAS	11/82	2	A
INDIANAPOLIS POWER & LIGHT						
PATRIOT	1	PATRIOT	INDIANA	0/87	6	C
PATRIOT	2	PATRIOT	INDIANA	0/87	6	C
PATRIOT	3	PATRIOT	INDIANA	0/87	6	C
PETERSBURG	3	PETERSBURG	INDIANA	12/77	1	B
PETERSBURG	4	PETERSBURG	INDIANA	10/84	2	B
IOWA ELECTRIC LIGHT & PWR						
GUTHRIE CO.	1	PANORA	IOWA	10/84	5	A

1. OPERATIONAL UNITS
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B. FEDERAL NSPS(12/71)
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D. STANDARD(S) MORE STRINGENT THAN NSPS(12/71) BUT NOT MORE STRINGENT THAN NSPS(6/79)
E. STANDARD(S) EQUAL TO OR LESS STRINGENT THAN NSPS(12/71)

EPA UTILITY FGD SURVEY: APRIL - JUNE 1982

SECTION 1
SUMMARY LIST OF FGD SYSTEMS

COMPANY NAME/ UNIT NAME	UNIT NO.	UNIT LOCATION		START-UP DATE	STATUS	REG CLASS
JACKSONVILLE ELECT. AUTHORITY						
NEW PROJECT	1	EAST PORT SITE	FLORIDA	0/85	6	A
NEW PROJECT	2	EAST PORT SITE	FLORIDA	0/87	6	A
KANSAS CITY POWER & LIGHT						
HAWTHORN	3	KANSAS CITY	MISSOURI	11/72	1	D
HAWTHORN	4	KANSAS CITY	MISSOURI	8/72	1	D
LA CYGNE	1	LA CYGNE	KANSAS	2/73	1	E
KANSAS POWER & LIGHT						
JEFFREY	1	WAMEGO	KANSAS	8/78	1	D
JEFFREY	2	WAMEGO	KANSAS	4/80	1	D
LAWRENCE	4	LAWRENCE	KANSAS	1/76	1	D
LAWRENCE	5	LAWRENCE	KANSAS	11/71	1	D
KENTUCKY UTILITIES						
GREEN RIVER	1-3	CENTRAL CITY	KENTUCKY	9/75	1	E
LAKELAND UTILITIES						
MCINTOSH	3	LAKELAND	FLORIDA	8/81	2	A
LANSING BOARD OF WATER & LIGHT						
ERICKSON	2	DELTA TOWNSHIP	MICHIGAN	1/87	6	C
LOS ANGELES DEPT OF WTR & PWR						
INTERMOUNTAIN	1	DELTA	UTAH	0/86	6	A
INTERMOUNTAIN	2	DELTA	UTAH	0/87	6	A
INTERMOUNTAIN	3	DELTA	UTAH	0/88	6	A
INTERMOUNTAIN	4	DELTA	UTAH	0/89	6	A
LOUISVILLE GAS & ELECTRIC						
CANE RUN	4	LOUISVILLE	KENTUCKY	8/76	1	D
CANE RUN	5	LOUISVILLE	KENTUCKY	12/77	1	D
CANE RUN	6	LOUISVILLE	KENTUCKY	4/79	1	D
MILL CREEK	1	LOUISVILLE	KENTUCKY	12/80	2	E
MILL CREEK	2	LOUISVILLE	KENTUCKY	12/81	2	E
MILL CREEK	3	LOUISVILLE	KENTUCKY	8/78	1	D
MILL CREEK	4	LOUISVILLE	KENTUCKY	7/81	2	B
PADDY'S RUN	6	LOUISVILLE	KENTUCKY	4/73	1	E
TRIMBLE COUNTY	1	BEDFORD	KENTUCKY	7/85	6	A
TRIMBLE COUNTY	2	BEDFORD	KENTUCKY	7/88	6	A
MARQUETTE BOARD OF LIGHT & PWR						
SHIRAS	3	MARQUETTE	MICHIGAN	10/82	5	A
MICHIGAN S. CENTRAL PWR AGENCY						
PROJECT	1	LITCHFIELD	MICHIGAN	4/82	3	A
MIDDLE SOUTH UTILITIES						
ARKANSAS LIGNITE	5		ARKANSAS	1/86	4	A
ARKANSAS LIGNITE	6		ARKANSAS	1/88	4	A
UNASSIGNED	1		UNDECIDED	0/85	4	A
UNASSIGNED	2		UNDECIDED	0/87	4	A
WILTON	1		LOUISIANA	0/86	4	A
WILTON	2		LOUISIANA	0/88	4	A
MINNESOTA POWER & LIGHT						
CLAY BOSWELL	4	COHASSET	MINNESOTA	4/80	1	B

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SUMMARY LIST OF FGD SYSTEMS

COMPANY NAME/ UNIT NAME	UNIT NO.	UNIT LOCATION		START-UP DATE	STATUS	REG CLASS
MINNKOTA POWER COOPERATIVE						
MILTON R. YOUNG	2	CENTER	NORTH DAKOTA	9/77	1	D
MONONGAHELA POWER						
PLEASANTS	1	BELMONT	WEST VIRGINIA	3/79	1	B
PLEASANTS	2	BELMONT	WEST VIRGINIA	9/80	2	B
MONTANA POWER						
COLSTRIP	1	COLSTRIP	MONTANA	9/75	1	B
COLSTRIP	2	COLSTRIP	MONTANA	5/76	1	B
COLSTRIP	3	COLSTRIP	MONTANA	0/83	2	C
COLSTRIP	4	COLSTRIP	MONTANA	0/84	2	C
MONTANA-DAKOTA UTILITIES						
COYOTE	1	BEULAH	NORTH DAKOTA	3/81	2	E
MUSCATINE POWER & WATER						
MUSCATINE	9	MUSCATINE	IOWA	9/82	3	B
NEBRASKA PUBLIC POWER DISTRICT						
FOSSIL III	1	SARGENT	NEBRASKA	3/87	6	A
NEVADA POWER						
HARRY ALLEN	1	N.E. LAS VEGAS	NEVADA	6/86	6	A
HARRY ALLEN	2	N.E. LAS VEGAS	NEVADA	6/87	6	A
HARRY ALLEN	3	N.E. LAS VEGAS	NEVADA	6/88	6	A
HARRY ALLEN	4	N.E. LAS VEGAS	NEVADA	6/89	6	A
REID GARDNER	1	MOAPA	NEVADA	4/74	1	B
REID GARDNER	2	MOAPA	NEVADA	4/74	1	B
REID GARDNER	3	MOAPA	NEVADA	6/76	1	B
REID GARDNER	4	MOAPA	NEVADA	4/83	4	A
WARNER VALLEY	1	ST. GEORGE	UTAH	6/85	5	A
WARNER VALLEY	2	ST. GEORGE	UTAH	6/86	5	A
NEW YORK STATE ELEC & GAS						
SOMERSET	1	SOMERSET	NEW YORK	6/84	5	E
NIAGARA MOHAWK POWER COOP						
CHARLES R. HUNTLEY	66	BUFFALO	NEW YORK	4/82	2	E
NORTHERN INDIANA PUB SERVICE						
DEAN H. MITCHELL	11	GARY	INDIANA	7/76	1	E
SCHAHFER	17	WHEATFIELD	INDIANA	6/83	3	A
SCHAHFER	18	WHEATFIELD	INDIANA	6/85	3	A
NORTHERN STATES POWER						
RIVERSIDE	6,7	MINNEAPOLIS	MINNESOTA	8/80	2	E
SHERBURNE	1	BECKER	MINNESOTA	3/76	1	D
SHERBURNE	2	BECKER	MINNESOTA	4/77	1	D
SHERBURNE	3	BECKER	MINNESOTA	5/85	5	C
PACIFIC GAS & ELECTRIC						
MONTEZUMA	1	COLLINSVILLE	CALIFORNIA	6/89	6	C
MONTEZUMA	2	COLLINSVILLE	CALIFORNIA	6/90	6	C
PACIFIC POWER & LIGHT						
JIM BRIDGER	4	ROCK SPRINGS	WYOMING	9/79	1	D
PENNSYLVANIA POWER						
BRUCE MANSFIELD	1	SHIPPINGPORT	PENNSYLVANIA	12/75	1	D
BRUCE MANSFIELD	2	SHIPPINGPORT	PENNSYLVANIA	7/77	1	D

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PENNSYLVANIA POWER						
BRUCE MANSFIELD	3	SHIPPINGPORT	PENNSYLVANIA	10/80	1	D
PHILADELPHIA ELECTRIC						
CROMBY	1	PHOENIXVILLE	PENNSYLVANIA	5/83	3	D
EDDYSTONE	1	EDDYSTONE	PENNSYLVANIA	12/82	2	D
EDDYSTONE	2	EDDYSTONE	PENNSYLVANIA	12/82	2	D
PLAINS ELECTRIC G & T COOP						
PLAINS ESCALANTE	1	PREWITT	NEW MEXICO	12/83	3	B
PLATTE RIVER POWER AUTHORITY						
RAWHIDE	1	FT. COLLINS	COLORADO	12/83	3	C
PUBLIC SERVICE INDIANA						
GIBSON	5	PRINCETON	INDIANA	0/82	3	B
PUBLIC SERVICE OF NEW MEXICO						
SAN JUAN	1	WATERFLOW	NEW MEXICO	4/78	1	C
SAN JUAN	2	WATERFLOW	NEW MEXICO	8/78	1	C
SAN JUAN	3	WATERFLOW	NEW MEXICO	12/79	1	C
SAN JUAN	4	WATERFLOW	NEW MEXICO	6/82	2	C
PWR AUTHORITY OF STATE OF NY						
FOSSIL		NEW YORK	NEW YORK	11/87	6	C
SALT RIVER PROJECT						
CORONADO	1	ST. JOHNS	ARIZONA	11/79	1	D
CORONADO	2	ST. JOHNS	ARIZONA	7/80	2	D
CORONADO	3	ST. JOHNS	ARIZONA	1/88	6	A
SAN MIGUEL ELECTRIC COOP						
SAN MIGUEL	1	SAN MIGUEL	TEXAS	10/80	2	B
SEMINOLE ELECTRIC						
SEMINOLE	1	PALATKA	FLORIDA	3/83	3	A
SEMINOLE	2	PALATKA	FLORIDA	3/85	3	A
SIERRA PACIFIC POWER						
VALMY	2	VALMY	NEVADA	8/84	7	A
SIKESTON BOARD OF MUNIC. UTIL.						
SIKESTON	1	SIKESTON	MISSOURI	1/81	2	B
SOUTH CAROLINA PUBLIC SERVICE						
CROSS	1	CROSS	SOUTH CAROLINA	3/85	3	A
CROSS	2	CROSS	SOUTH CAROLINA	11/83	3	A
WINYAH	2	GEORGETOWN	SOUTH CAROLINA	7/77	1	B
WINYAH	3	GEORGETOWN	SOUTH CAROLINA	5/80	1	B
WINYAH	4	GEORGETOWN	SOUTH CAROLINA	7/81	2	A
SOUTH MISSISSIPPI ELEC PWR						
R.D. MORROW	1	HATTISBURG	MISSISSIPPI	8/78	1	B
R.D. MORROW	2	HATTISBURG	MISSISSIPPI	6/79	1	B
SOUTHERN ILLINOIS POWER COOP						
MARION	4	MARION	ILLINOIS	5/79	1	B
MARION	5	MARION	ILLINOIS	0/86	6	A

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SOUTHERN INDIANA GAS & ELEC						
A.B. BROWN	1	WEST FRANKLIN	INDIANA	4/79	1	B
SOUTHWESTERN ELECTRIC POWER						
HENRY W. PIRKEY	1	HALLSVILLE	TEXAS	12/84	3	B
SPRINGFIELD CITY UTILITIES						
SOUTHWEST	1	SPRINGFIELD	MISSOURI	4/77	1	B
SPRINGFIELD WATER, LIGHT & PWR						
DALLMAN	3	SPRINGFIELD	ILLINOIS	11/80	2	B
ST. JOE ZINC						
G.F. WEATON	1	MONACA	PENNSYLVANIA	11/79	1	B
SUNFLOWER ELECTRIC COOP						
HOLCOMB	1	HOLCOMB	KANSAS	0/83	3	A
TAMPA ELECTRIC						
BIG BEND	4	TAMPA	FLORIDA	12/84	3	A
TENNESSEE VALLEY AUTHORITY						
JOHNSONVILLE	1-10	NEW JOHNSONVILL	TENNESSEE	12/81	3	E
PARADISE	1	PARADISE	KENTUCKY	3/82	2	E
PARADISE	2	PARADISE	KENTUCKY	6/82	2	E
SHAWNEE	1CA	PADUCAH	KENTUCKY	4/72	1	E
SHAWNEE	1CB	PADUCAH	KENTUCKY	4/72	1	E
WIDOWS CREEK	7	BRIDGEPORT	ALABAMA	9/81	2	E
WIDOWS CREEK	8	BRIDGEPORT	ALABAMA	5/77	1	E
TEXAS MUNICIPAL POWER AGENCY						
GIBBONS CREEK	1	CARLOS	TEXAS	1/82	2	A
TEXAS POWER & LIGHT						
SANDOW	4	ROCKDALE	TEXAS	9/80	2	B
TWIN OAKS	1	BREMOND	TEXAS	8/84	3	A
TWIN OAKS	2	BREMOND	TEXAS	8/85	3	A
TEXAS UTILITIES						
FOREST GROVE	1	ATHENS	TEXAS	0/81	5	A
MARTIN LAKE	1	TATUM	TEXAS	4/77	1	B
MARTIN LAKE	2	TATUM	TEXAS	5/78	1	B
MARTIN LAKE	3	TATUM	TEXAS	2/79	1	B
MARTIN LAKE	4	TATUM	TEXAS	0/85	3	A
MILL CREEK	1	HENDERSON	TEXAS	0/85	6	A
MILL CREEK	2	HENDERSON	TEXAS	0/86	6	A
MONTICELLO	3	MT. PLEASANT	TEXAS	5/78	1	B
TUCSON ELECTRIC POWER						
SPRINGERVILLE	1	SPRINGERVILLE	ARIZONA	1/85	3	B
SPRINGERVILLE	2	SPRINGERVILLE	ARIZONA	10/86	3	B
UNITED POWER ASSOCIATION						
STANTON	1A	STANTON	NORTH DAKOTA	1/82	3	A
UTAH POWER & LIGHT						
HUNTER	1	CASTLE DALE	UTAH	5/79	1	B
HUNTER	2	CASTLE DALE	UTAH	6/80	1	B
HUNTER	3	CASTLE DALE	UTAH	0/83	3	A
HUNTER	4	CASTLE DALE	UTAH	0/85	3	A
HUNTINGTON	1	PRICE	UTAH	5/78	1	B

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SUMMARY LIST OF FGD SYSTEMS

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WEST PENN POWER						
MITCHELL	33	COURTNEY	PENNSYLVANIA	8/82	3	C
WEST TEXAS UTILITIES						
OKLAUNION	1	OKLAUNION	TEXAS	0/87	7	A

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SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
ALABAMA ELECTRIC COOP TOMBIGBEE 2 NEW 255.0 MW (GROSS) 179.0 MW (ESC) COAL 1.15 %S BITUMINOUS LIMESTONE PEABODY PROCESS SYSTEMS ENERGY CONSUMPTION: 3.1% STATUS 1 STARTUP 9/78	TOMBIGBEE 2 OF ALABAMA ELECTRIC COOP IS A PULVERIZED COAL BOILER LOCATED IN LEROY, ALABAMA. THE BOILER GENERATES A MAXIMUM FLUE GAS FLOW OF 953,000 ACFM AND BURNS BITUMINOUS COAL WITH AN AVERAGE SULFUR CONTENT OF 1.15% AND AN AVERAGE HEAT CONTENT OF 11,500 BTU/LB. THE UNIT SO2 EMMISSION LIMITATION VALUE IS 1.2 LB/MMBTU. PRIMARY PARTICULATE MATTER CONTROL IS PROVIDED BY A HOT SIDE ESP. THE SO2 REMOVAL EQUIPMENT CONSISTS OF TWO SPRAY TOWERS SUPPLIED BY PEABODY PROCESS SYSTEMS WHICH UTILIZE A LIMESTONE REAGENT. A CHEVRON MIST ELIMINATOR IS INCLUDED FOR EACH TOWER AND THE FLUE GAS IS REHEATED WITH BYPASSED GAS BEFORE BEING VENTED TO A 400 FOOT ACID-BRICK LINED STACK. THE SYSTEM OPERATES IN AN OPEN WATER LOOP MODE AND SPENT ABSORBENT IS DISPOSED OF IN AN ON-SITE LINED POND.
ALABAMA ELECTRIC COOP TOMBIGBEE 3 NEW 255.0 MW (GROSS) 179.0 MW (ESC) COAL 1.15 %S BITUMINOUS LIMESTONE PEABODY PROCESS SYSTEMS ENERGY CONSUMPTION: 3.1% STATUS 1 STARTUP 6/79	TOMBIGBEE 3 OF ALABAMA ELECTRIC COOP IS A PULVERIZED COAL BOILER LOCATED IN LEROY, ALABAMA. THE BOILER GENERATES A MAXIMUM FLUE GAS FLOW OF 953,000 ACFM AND BURNS BITUMINOUS COAL WITH AN AVERAGE SULFUR CONTENT OF 1.15% AND AN AVERAGE HEAT CONTENT OF 11,500 BTU/LB. THE UNIT SO2 EMISSION LIMITATION VALUE IS 1.2 LB/MMBTU. PRIMARY PARTICULATE CONTROL IS PROVIDED BY A HOT SIDE ESP. THE SO2 REMOVAL EQUIPMENT CONSISTS OF TWO SPRAY TOWERS SUPPLIED BY PEABODY PROCESS SYSTEMS WHICH UTILIZE A LIMESTONE REAGENT. A CHEVRON MIST ELIMINATOR IS INCLUDED IN EACH TOWER, AND THE FLUE GAS IS REHEATED WITH BYPASSED GAS BEFORE BEING VENTED TO A 400 FOOT ACID BRICK LINED STACK. THE SYSTEM OPERATES IN AN OPEN WATER LOOP MODE, AND SPENT ABSORBENT IS DISPOSED IN AN ON-SITE LINED POND.
ARIZONA ELECTRIC POWER COOP APACHE 2 NEW 195.0 MW (GROSS) 97.5 MW (ESC) COAL .55 %S BITUMINOUS LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 4.1% STATUS 1 STARTUP 8/78	APACHE 2 OF ARIZONA ELECTRIC POWER COOP IS LOCATED IN COCHISE, ARIZONA AND IS A DRY BOTTOM PULVERIZED COAL FIRED UNIT WITH A FLUE GAS FLOW OF 735,000 ACFM. BITUMINOUS COAL WITH A HEATING VALUE OF 10,000 BTU/LB, A SULFUR CONTENT OF 0.55% AND AN ASH CONTENT OF 15% IS THE FUEL USED FOR THIS UNIT. PARTICULATE CONTROL IS EFFECTED BY A HOT SIDE ESP. THE UNIT IS CURRENTLY IN OPERATION WITH STARTUP IN AUGUST 1978. TWO PACKED TOWERS EMPLOYING LIMESTONE ABSORBENT AND HAVING A DESIGN SO2 REMOVAL OF 85% WERE SUPPLIED BY RESEARCH-COTTRELL. MIST ELIMINATION IS PROVIDED BY CHEVRON TYPE ELIMINATORS. NO REHEAT IS EMPLOYED. A 400 FT COLE BRAND CXL2000 LINED STACK IS IN USE. THE SYSTEM OPERATES IN AN OPEN WATER LOOP MODE AND WASTE MATERIAL IS DISPOSED OF IN OFF-SITE SLUDGE PONDS.
ARIZONA ELECTRIC POWER COOP APACHE 3 NEW 195.0 MW (GROSS) 97.5 MW (ESC) COAL .55 %S BITUMINOUS LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 4.1% STATUS 1 STARTUP 6/79	APACHE 3 OF ARIZONA ELECTRIC POWER COOP IS A DRY BOTTOM, PULVERIZED COAL FIRED UNIT IN COCHISE, ARIZONA. LOW (0.55%) SULFUR BITUMINOUS COAL WITH AN AVERAGE HEATING VALUE OF 10,000 BTU/LB PRODUCES A MAXIMUM FLUE GAS FLOW OF 735,000 ACFM. THE FLUE GAS PASSES THROUGH A HOT SIDE ESP TO TWO RESEARCH COTTRELL PACKED TOWERS, WHERE LIMESTONE IS USED TO REMOVE 85% (DESIGN) OF THE SO2. THE GAS EXITS A HORIZONTAL CHEVRON MIST ELIMINATOR INTO ITS OWN CEILCOTE LINED FLUE IN THE 400 FOOT STACK IT SHARES WITH UNIT 2. THE FGD, WHICH HAS BEEN OPERATIONAL SINCE JUNE OF 1979, USES NO REHEAT. THE SYSTEM OPERATES IN AN OPEN WATER LOOP AND SLUDGE IS DISPOSED OF IN TWO OFF SITE LINED PONDS WITH 20 YEARS' EXPECTED LIFESPAN. TWO ADDITIONAL PONDS ARE PLANNED, WHICH WOULD ADD ANOTHER 20 YEARS' CAPACITY.
ARIZONA PUBLIC SERVICE CHOLLA 1 RETROFIT 119.0 MW (GROSS) 119.0 MW (ESC) COAL .50 %S BITUMINOUS LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 3.4% STATUS 1 STARTUP 10/73	ARIZONA PUBLIC SERVICE'S CHOLLA 1 IS LOCATED IN JOSEPH CITY, ARIZONA AND IS A TANGENTIALLY FIRED, WET BOTTOM PULVERIZED COAL UNIT. IT IS FUELED BY BITUMINOUS COAL THAT HAS A SULFUR CONTENT OF 0.5% AND A HEATING VALUE OF 10,150 BTU/LB. PARTICULATE MATTER IS CONTROLLED BY TWO FLOODED DISC SCRUBBERS. THE FGD SYSTEM BEGAN IN OCTOBER, 1973 AND IS NOW OPERATIONAL. SO2 IS CONTROLLED BY ONE TOWER WITH MUNTERS PACKING EMPLOYING A LIMESTONE ABSORBENT. THE UNIT WAS SUPPLIED BY RESEARCH COTTRELL AND HAS A DESIGN REMOVAL OF 92%. CHEVRON MIST ELIMINATORS ARE LOCATED PRIOR TO AN IN-LINE STEAM REHEAT SYSTEM. THE TREATED FLUE GAS IS VENTED TO A 256 FT ACID BRICK LINED STACK. THE FGD SYSTEM OPERATES IN AN OPEN WATER LOOP MODE AND THE UNTREATED WASTE IS DISPOSED OF IN AN ON-SITE UNLINED POND.
ARIZONA PUBLIC SERVICE CHOLLA 2 NEW 264.0 MW (GROSS) 264.0 MW (ESC) COAL .50 %S BITUMINOUS LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 4/78	CHOLLA 2 OF ARIZONA PUBLIC SERVICE IS LOCATED IN JOSEPH CITY, ARIZONA. THE BOILER BURNS PULVERIZED BITUMINOUS COAL (0.5% S, 10,150 BTU/LB). MECHANICAL COLLECTORS PROVIDE PRIMARY PARTICULATE CONTROL. FOUR PARALLEL FLOODED DISC AND PACKED TOWER SO2 ABSORBER TRAINS (THREE ARE REQUIRED FOR FULL LOAD) REMOVE THE FLUE GAS SO2. THE DESIGN SO2 REMOVAL FOR THE SYSTEM, WHICH BEGAN OPERATIONS IN APRIL, 1978, IS 75%. THE CLEANED GAS PASSES THROUGH AN IN-LINE STEAM REHEATER INTO AN ACID BRICK LINED STACK. THE OPEN WATER LOOP SYSTEM DEPOSITS ITS SLUDGE INTO A FLY ASH POND.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
ARIZONA PUBLIC SERVICE CHOLLA 4 NEW 375.0 MW (GROSS) 126.0 MW (ESC) COAL .50 %S LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 6/81	CHOLLA 4 OF ARIZONA PUBLIC SERVICE IS PRESENTLY UNDER CONSTRUCTION IN JOSEPH CITY, ARIZONA. START UP IS SCHEDULED FOR JUNE, 1980. THE PULVERIZED COAL (0.5% S, 10,150 BTU/LB) FIRED BOILER WILL EXHAUST FLUE GAS THROUGH AN ESP TO A PACKED TOWER WHICH WILL TREAT 36% OF THE GAS WITH LIMESTONE.
ARIZONA PUBLIC SERVICE FOUR CORNERS 1 RETROFIT 175.0 MW (GROSS) 175.0 MW (ESC) COAL .75 %S SUBBITUMINOUS LIME/ALKALINE FLYASH CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 11/79	ARIZONA PUBLIC SERVICE HAS UPGRADED THE OPERATIONAL PARTICULATE SCRUBBERS AT FOUR CORNERS 1, 2, AND 3 IN FARMINGTON, NEW MEXICO TO HANDLE ADDITIONAL SO2 REMOVAL. INITIALLY, THE FRONT FIRED, DRY BOTTOM, PULVERIZED COAL (SUBBITUMINOUS, 0.75% S, 8650 BTU/LB) UNITS 1 AND 2 SUPPLY 814,000 ACFM EACH INTO 2 CHEMICO VENTURI SCRUBBERS PER UNIT FOR PRIMARY PARTICULATE CONTROL AND APPROXIMATELY 30% SO2 REMOVAL USING ALKALINE FLY ASH. THE DESIGN SO2 REMOVAL EFFICIENCY SINCE THE CONVERSION TO LIME AND ALKALINE FLY ASH SCRUBBING IS 67.5%. OPERATIONS COMMENCED IN NOVEMBER, 1979.
ARIZONA PUBLIC SERVICE FOUR CORNERS 2 RETROFIT 175.0 MW (GROSS) 175.0 MW (ESC) COAL .75 %S SUBBITUMINOUS LIME/ALKALINE FLYASH CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 11/79	ARIZONA PUBLIC SERVICE HAS UPGRADED THE OPERATIONAL PARTICULATE SCRUBBERS AT FOUR CORNERS 1,2, AND 3 IN FARMINGTON, NEW MEXICO TO HANDLE ADDITIONAL SO2 REMOVAL. INITIALLY, THE FRONT FIRED, DRY BOTTOM, PULVERIZED COAL (SUBBITUMINOUS, 0.75% S, 8650 BTU/LB) UNITS 1 AND 2 SUPPLY 814,000 ACFM EACH INTO 2 CHEMICO VENTURI SCRUBBERS PER UNIT FOR PRIMARY PARTICULATE CONTROL AND APPROXIMATELY 30% SO2 REMOVAL USING ALKALINE FLY ASH. THE DESIGN SO2 REMOVAL EFFICIENCY SINCE THE CONVERSION TO LIME AND ALKALINE FLY ASH SCRUBBING IS 67.5%. OPERATIONS COMMENCED IN NOVEMBER, 1979.
ARIZONA PUBLIC SERVICE FOUR CORNERS 3 RETROFIT 229.0 MW (GROSS) 229.0 MW (ESC) COAL .75 %S SUBBITUMINOUS LIME/ALKALINE FLYASH CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 11/79	ARIZONA PUBLIC SERVICE HAS UPGRADED THE OPERATIONAL PARTICULATE SCRUBBERS AT FOUR CORNERS 1,2, AND 3 IN FARMINGTON, NEW MEXICO TO HANDLE ADDITIONAL SO2 REMOVAL. INITIALLY, THE FRONT FIRED, DRY BOTTOM, PULVERIZED COAL (SUBBITUMINOUS, 0.75% S, 8650 BTU/LB) UNIT 3 SUPPLIES 1,030,000 ACFM INTO 2 CHEMICO VENTURI SCRUBBERS FOR PRIMARY PARTICULATE CONTROL AND APPROXIMATELY 30% SO2 REMOVAL USING ALKALINE FLY ASH. THE DESIGN SO2 REMOVAL EFFICIENCY SINCE THE CONVERSION TO LIME AND ALKALINE FLY ASH SCRUBBING IS 67.5%. OPERATIONS COMMENCED IN NOVEMBER, 1979.
ARIZONA PUBLIC SERVICE FOUR CORNERS 4 RETROFIT 755.0 MW (GROSS) 755.0 MW (ESC) COAL .75 %S LIME UNITED ENGINEERS ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 0/82	ARIZONA PUBLIC SERVICE AWARDED A CONTRACT TO UNITED ENGINEERS FOR A LIME FGD SYSTEM TO BE RETROFITTED ONTO UNITS 4 AND 5 AT ITS FOUR CORNERS STATION IN FARMINGTON, NEW MEXICO. BASED ON THE PROTOTYPE HORIZONTAL SCRUBBING PROGRAM CONDUCTED BY THE UTILITY, A HORIZONTAL SYSTEM WAS CHOSEN TO CONTROL THE EMISSIONS FROM THESE COAL (0.75% S, 8650 BTU/LB) FIRED UNITS. THE PARTICULATE EMISSIONS ARE HANDLED BY AN ESP. START UP IS EXPECTED IN 1982.
ARIZONA PUBLIC SERVICE FOUR CORNERS 5 RETROFIT 755.0 MW (GROSS) 755.0 MW (ESC) COAL .75 %S LIME UNITED ENGINEERS ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 0/82	ARIZONA PUBLIC SERVICE AWARDED A CONTRACT TO UNITED ENGINEERS FOR A LIME FGD SYSTEM TO BE RETROFITTED ONTO UNITS 4 AND 5 AT ITS FOUR CORNERS STATION IN FARMINGTON, NEW MEXICO. BASED ON THE PROTOTYPE HORIZONTAL SCRUBBING PROGRAM CONDUCTED BY THE UTILITY, A HORIZONTAL SYSTEM WAS CHOSEN TO CONTROL THE EMISSIONS FROM THESE COAL (0.75% S, 8650 BTU/LB) FIRED UNITS. THE PARTICULATE EMISSIONS ARE HANDLED BY AN ESP. START UP IS EXPECTED IN 1982.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
ASSOCIATED ELECTRIC COOP THOMAS HILL 3 NEW 730.0 MW (GROSS) 670.0 MW (ESC) COAL 4.80 %S LIMESTONE PULLMAN KELLOGG ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 1/82	THOMAS HILL 3 OF ASSOCIATED ELECTRIC COOP IS A PULVERIZED COAL (4.8% S, 9,700 BTU/LB) FIRED UNIT LOCATED IN MOBERLY, MISSOURI. TWO COLD SIDE ESP'S WILL PRECEDE THE FOUR 91.5% EFFICIENT PULLMAN KELLOGG HORIZONTAL WEIR FGD MODULES USING MAGNESIUM-PROMOTED LIMESTONE AS THE ABSORBENT. THE CLEANED GAS WILL PASS THROUGH A VERTICAL CHEVRON MIST ELIMINATOR TO A 620 FOOT BRICK LINED STACK. REHEAT WILL BE ACCOMPLISHED BY BYPASS. DRY FIXATED SLUDGE WILL BE TRUCKED TO AN ACTIVE STRIP MINE. THE SYSTEM WILL USE A CLOSED WATER LOOP. THE FGD SYSTEM IS UNDER CONSTRUCTION AND START UP IS EXPECTED IN JANUARY, 1982.
BASIN ELECTRIC POWER COOP ANTELOPE VALLEY 1 NEW 440.0 MW (GROSS) 440.0 MW (ESC) COAL .68 %S LIGNITE LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER ENERGY CONSUMPTION: .0% STATUS 2 STARTUP 4/83	UNIT 1 OF BASIN ELECTRIC POWER COOP'S ANTELOPE VALLEY PLANT IS PRESENTLY UNDER CONSTRUCTION IN BEULAH, NORTH DAKOTA. THIS UNIT WILL BURN PULVERIZED COAL (0.68% S, 6600 BTU/LB LIGNITE) AND SUPPLY 2,055,000 ACFM TO A DRY LIME FGD SYSTEM SUPPLIED BY WESTERN PRECIPITATION. THE 62% EFFICIENT SYSTEM WILL CONSIST OF 5 NIRO ATOMIZER SPRAY DRYERS AND TWO BAGHOUSES. THE CLEANED GAS, ALONG WITH A 4% BYPASS REHEAT, WILL EXIT A 600 FOOT PVC LINED STACK. THE SYSTEM WILL USE A CLOSED WATER LOOP AND THE DRY POWDER WILL BE USED FOR LANDFILL IN A COAL MINE. START UP IS EXPECTED IN APRIL, 1983.
BASIN ELECTRIC POWER COOP ANTELOPE VALLEY 2 NEW 440.0 MW (GROSS) 440.0 MW (ESC) COAL .68 %S LIGNITE LIME/SPRAY DRYING VENDOR NOT SELECTED ENERGY CONSUMPTION: .0% STATUS 5 STARTUP 10/85	ANTELOPE VALLEY 2 OF BASIN ELECTRIC POWER COOP WILL BE LOCATED IN BEULAH, NORTH DAKOTA. THE UTILITY IS PRESENTLY CONSIDERING VARIOUS FGD PROCESSES FOR THIS LIGNITE (0.68% S, 6600 BTU/LB) FIRED UNIT. THE UNIT WILL BE REQUIRED TO COMPLY WITH STATE EMISSIONS STANDARDS VIA BEST AVAILABLE CONTROL TECHNOLOGY. START UP IS SCHEDULED FOR OCTOBER, 1985.
BASIN ELECTRIC POWER COOP LARAMIE RIVER 1 NEW 570.0 MW (GROSS) 570.0 MW (ESC) COAL .81 %S SUBBITUMINOUS LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: .0% STATUS 2 STARTUP 7/80	BASIN ELECTRIC POWER COOP'S LARAMIE RIVER 1 IS PRESENTLY UNDER CONSTRUCTION IN WHEATLAND, WYOMING. THE PULVERIZED COAL (0.81% S, 8139 BTU/LB) FIRED BOILER WILL FEED 2,300,000 ACFM OF FLUE GAS THROUGH A COLD SIDE ESP TO FIVE RESEARCH COTTRELL LIMESTONE PACKED TOWER MODULES, WHICH WILL REMOVE 90% OF THE SO2. THE CLEANED GAS WILL EXIT FROM A VERTICAL CHEVRON DEMISTER INTO A 600 FOOT ACID BRICK LINED STACK. NO REHEAT WILL BE USED. THE FLYASH FIXATED SLUDGE WILL BE DEWATERED TO 83% SOLIDS BEFORE BEING LANDFILLED, AND THE SYSTEM WILL EMPLOY A CLOSED WATER LOOP. START UP IS SCHEDULED FOR APRIL, 1980.
BASIN ELECTRIC POWER COOP LARAMIE RIVER 2 NEW 570.0 MW (GROSS) 570.0 MW (ESC) COAL .81 %S SUBBITUMINOUS LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: .0% STATUS 2 STARTUP 6/81	BASIN ELECTRIC POWER COOP'S LARAMIE RIVER 2 IS PRESENTLY UNDER CONSTRUCTION IN WHEATLAND, WYOMING. THE PULVERIZED COAL (0.81% S, 8139 BTU/LB) FIRED BOILER WILL FEED 2,300,000 ACFM OF FLUE GAS THROUGH A COLD SIDE ESP TO FIVE RESEARCH COTTRELL LIMESTONE PACKED TOWER MODULES, WHICH WILL REMOVE 90% OF THE SO2. THE CLEANED GAS WILL EXIT FROM A VERTICAL CHEVRON DEMISTER INTO A 600 FOOT ACID BRICK LINED STACK. NO REHEAT WILL BE USED. THE FLYASH FIXATED SLUDGE WILL BE DEWATERED TO 83% SOLIDS BEFORE BEING LANDFILLED, AND THE SYSTEM WILL EMPLOY A CLOSED WATER LOOP. START UP IS SCHEDULED FOR JUNE, 1981.
BASIN ELECTRIC POWER COOP LARAMIE RIVER 3 NEW 570.0 MW (GROSS) 570.0 MW (ESC) COAL .54 %S SUBBITUMINOUS LIME/SPRAY DRYING BABCOCK & WILCOX ENERGY CONSUMPTION: .0% STATUS 2 STARTUP 4/82	LARAMIE RIVER 3 OF BASIN ELECTRIC POWER COOP IS UNDER CONSTRUCTION IN WHEATLAND, WYOMING, AND WILL UTILIZE FOUR DRY LIME INJECTION MODULES, AND A COLD SIDE ESP. THE BOILER WILL FIRE PULVERIZED COAL (0.54% S, 8100 BTU/LB) AND WILL SUPPLY 2,800,000 ACFM OF FLUE GAS TO THE FGD SYSTEM, WHICH WILL REMOVE 85% OF THE SO2 BEFORE THE GAS EXITS THROUGH A 600 FOOT ACID BRICK LINED STACK. A 3% BYPASS WILL BE USED FOR REHEAT. THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP, AND WILL LANDFILL THE DRY POWDER WASTE. OPERATIONS ARE SCHEDULED TO COMMENCED IN APRIL, 1982.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
BIG RIVERS ELECTRIC D. B. WILSON 1 NEW 440.0 MW (GROSS) 440.0 MW (ESC) COAL ***** %S BITUMINOUS LIME VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 11/84	BIG RIVERS ELECTRIC HAS PLANS FOR TWO NEW UNITS, D.B. WILSON 1 AND 2. THE PULVERIZED COAL FIRED BOILERS WILL HAVE A MW RATING OF 440 EACH. THE UNITS WILL UTILIZE EITHER A LIME, LIMESTONE OR DUAL ALKALI FGD SYSTEM. START UP OF UNIT 1 IS EXPECTED IN 1984.
BIG RIVERS ELECTRIC D. B. WILSON 2 NEW 440.0 MW (GROSS) 440.0 MW (ESC) COAL ***** %S BITUMINOUS LIME VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/85	BIG RIVERS ELECTRIC HAS PLANS FOR TWO NEW UNITS, D.B. WILSON 1 AND 2. THE PULVERIZED COAL FIRED BOILERS WILL HAVE A MW RATING OF 440 EACH. THE UNITS WILL UTILIZE EITHER A LIME, LIMESTONE OR DUAL ALKALI FGD SYSTEM. START UP OF UNIT 2 IS EXPECTED IN 1985.
BIG RIVERS ELECTRIC GREEN 1 NEW 242.0 MW (GROSS) 242.0 MW (ESC) COAL 3.75 %S BITUMINOUS LIME AMERICAN AIR FILTER ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 12/79	UNIT 1 OF BIG RIVERS ELECTRIC'S GREEN STATION IS LOCATED IN SEBREE,KENTUCKY. THE DRY BOTTOM PULVERIZED COAL (3.75% S, 9750 BTU/LB) FIRED BOILER SUPPLIES 1,000,000 ACFM TO A COLD SIDE ESP FOLLOWED BY TWO AMERICAN AIR FILTER LIME SPRAY TOWERS WHICH WILL REMOVE 90% OF THE SO2. THE CLEANED GAS PASSES THROUGH A CHEVRON MIST ELIMINATOR AND EXITS A SAUERISEN 72 LINED STACK AFTER IT IS HEATED BY STEAM COIL REHEATER. THE SLUDGE FROM THE CLOSED WATER LOOP SYSTEM IS POZ-O-TEC STABILIZED. OPERATIONS COMMENCED IN DECEMBER 1979.
BIG RIVERS ELECTRIC GREEN 2 NEW 242.0 MW (GROSS) 242.0 MW (ESC) COAL 3.75 %S BITUMINOUS LIME AMERICAN AIR FILTER ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 11/80	UNIT 2 OF BIG RIVERS ELECTRIC'S GREEN STATION IS BEING CONSTRUCTED IN SEBREE, KENTUCKY. THE DRY BOTTOM PULVERIZED COAL (3.75% S, 9750 BTU/LB) FIRED BOILER WILL SUPPLY 1,000,000 ACFM TO A COLD SIDE ESP FOLLOWED BY TWO AMERICAN AIR FILTER LIME SPRAY TOWERS WHICH WILL REMOVE 90% OF THE SO2. THE CLEANED GAS WILL PASS THROUGH A CHEVRON MIST ELIMINATOR AND WILL EXIT A SAUERISEN 72 LINED STACK AFTER IT IS HEATED BY STEAM COIL REHEATER. THE SLUDGE FROM THE CLOSED WATER LOOP SYSTEM WILL BE POZ-O-TEC STABILIZED. START UP IS SCHEDULED FOR NOVEMBER, 1980.
CAJUN ELECTRIC POWER COOP BIG CAJUN 3 1 NEW 540.0 MW (GROSS) 540.0 MW (ESC) COAL ***** %S LIGNITE PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/85	CAJUN ELECTRIC HAS PLANS TO CONSTRUCT A 540 MW UNIT, BIG CAJUN 3, TO BE LOCATED IN DE SOLO PARISH, LOUISIANA. THE UTILITY IS PRESENTLY CONSIDERING A DRY SCRUBBING PROCESS TO CONTROL EMISSIONS FROM THE PULVERIZED COAL FIRED BOILER. THE UNIT IS SCHEDULED TO COMMENCE OPERATIONS IN 1985.
CENTRAL ILLINOIS LIGHT DUCK CREEK 1 NEW 416.0 MW (GROSS) 416.0 MW (ESC) COAL 3.30 %S BITUMINOUS LIMESTONE ENVIRONEERING, RILEY STOKER ENERGY CONSUMPTION: 2.9% STATUS 1 STARTUP 7/76	DUCK CREEK 1 OF CENTRAL ILLINOIS LIGHT IS LOCATED IN CANTON, ILLINOIS. THE BALANCED DRAFT, FRONT FIRED, DRY BOTTOM UNIT BURNS PULVERIZED BITUMINOUS COAL (3.3% S, 10,500 BTU/LB) AND SUPPLIES 2,415,000 ACFM OF FLUE GAS TO TWO COLD SIDE ESP'S FOLLOWED BY FOUR RILEY STOKER/ENVIRONEERING ROD DECK SPRAY TOWER MODULES. THE FGD SYSTEM HAS BEEN OPERATIONAL (ONE MODULE) SINCE JULY, 1976, AND IS DESIGNED TO REMOVE 85% OF THE SO2. HORIZONTAL CHEVRON MIST ELIMINATORS FOLLOW THE ABSORBERS, AND THE CLEANED GAS EXITS TO A 500 FOOT CEILCOTE LINED STACK WITHOUT REHEAT. THE SYSTEM OPERATES IN A CLOSED WATER LOOP, AND THE SLUDGE IS DISPOSED OF IN AN ON SITE CLAY LINED POND.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
CENTRAL ILLINOIS LIGHT DUCK CREEK 2 NEW 450.0 MW (GROSS) 450.0 MW (ESC) COAL 3.30 %S BITUMINOUS LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 1/86	CENTRAL ILLINOIS LIGHT IS CURRENTLY EVALUATING BIDS ON A LIMESTONE OR DUAL ALKALI FGD SYSTEM FOR UNIT 2 OF ITS DUCK CREEK STATION. THE BITUMINOUS COAL FIRED BOILER WILL FEED ITS FLUE GAS THROUGH A COLD SIDE ESP. THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP AND IS SCHEDULED TO BEGIN OPERATIONS IN JANUARY, 1986.
CENTRAL ILLINOIS PUBLIC SERV NEWTON 1 NEW 617.0 MW (GROSS) 617.0 MW (ESC) COAL 2.25 %S BITUMINOUS DUAL ALKALI BUELL DIVISION, ENVIROTECH ENERGY CONSUMPTION: 2.4% STATUS 1 STARTUP 9/79	NEWTON 1 OF CENTRAL ILLINOIS PUBLIC SERVICE IS A TANGENTIALLY FIRED, DRY BOTTOM, PULVERIZED BITUMINOUS COAL (2.25% S, 10,900 BTU/LB) FIRED UNIT LOCATED IN NEWTON, ILLINOIS. A COLD SIDE ESP RECEIVES 2,163,480 ACFM OF FLUE GAS AND FEEDS IT TO FOUR BUELL ENVIROTECH POLYSPHERE PACKED TRAY TOWERS FOLLOWED BY TWO VERTICAL MIST ELIMINATORS PER MODULE. THE CLEANED GAS IS BOOSTED 25 DEG F BY A COMBINATION OF TWO DIFFERENT TYPES OF IN-LINE REHEATERS PLUS BYPASS REHEAT, AND THEN EXITS A 530 FOOT PRECRETE LINED STACK. THE WATER LOOP IS CLOSED, AND THE SLUDGE IS POZ-O-TEC TREATED.
CENTRAL MAINE POWER SEARS ISLAND 1 NEW 600.0 MW (GROSS) 600.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 1/89	SEARS ISLAND 1 IS A PLANNED UNIT TO BE BUILT ON PENOBSCOT BAY BY CENTRAL MAINE POWER. BECAUSE OF THE DISCOVERY OF A GEOLOGICAL FAULT ON SEARS ISLAND, PLANS FOR A 1150 MW NUCLEAR POWER PLANT HAVE BEEN REPLACED WITH PLANS FOR A 600 MW COAL FIRED PLANT. LIME AND LIMESTONE SCRUBBING ARE THE PRIMARY METHODS BEING CONSIDERED FOR COMPLIANCE WITH THE NSPS. IT WILL BE TWO YEARS BEFORE ALL PERMITS REQUIRED HAVE BEEN RECEIVED. START UP IS SCHEDULED FOR JANUARY, 1989.
CINCINNATI GAS & ELECTRIC EAST BEND 1 NEW 650.0 MW (GROSS) 650.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: 2.9% STATUS 6 STARTUP 0/ 0	CINCINNATI GAS AND ELECTRIC HAS PLANS FOR A NEW UNIT, EAST BEND 1, TO BE LOCATED ADJACENT TO EAST BENT 2 AT THE RABBITHASH, KENTUCKY SITE. THE COAL FIRED BOILER WILL HAVE A GENERATING CAPACITY OF 650 MW. THE UNIT'S EXPECTED START UP HAS NOT BEEN DETERMINED.
CINCINNATI GAS & ELECTRIC EAST BEND 2 NEW 650.0 MW (GROSS) 650.0 MW (ESC) COAL 5.00 %S LIME BABCOCK & WILCOX ENERGY CONSUMPTION: 2.9% STATUS 2 STARTUP 9/80	EAST BEND 2 OF CINCINNATI GAS AND ELECTRIC IS A PULVERIZED COAL (5% S) FIRED BOILER UNDER CONSTRUCTION IN RABBITHASH, KENTUCKY. THE EMISSION CONTROL SYSTEM CONSISTS OF A HOT SIDE ESP FOLLOWED BY THREE BABCOCK AND WILCOX LIME FGD MODULES. THE 87% CLEANED GAS WILL PASS THROUGH A CHEVRON MIST ELIMINATOR BEFORE BEING WARMED BY AN INDIRECT HOT AIR REHEATER AND EXITING THROUGH A BRICK LINED 650 FOOT STACK. THE SLUDGE FROM THIS CLOSED WATER LOOP SYSTEM WILL BE POZ-O-TEC STABILIZED BEFORE DISPOSAL IN AN ON SITE LANDFILL. START UP IS EXPECTED IN SEPTEMBER, 1980.
COLORADO UTE ELECTRIC ASSN. CRAIG 1 NEW 447.0 MW (GROSS) 447.0 MW (ESC) COAL .45 %S SUBBITUMINOUS LIMESTONE PEABODY PROCESS SYSTEMS ENERGY CONSUMPTION: 5.4% STATUS 2 STARTUP 7/80	THE COLORADO UTE ELECTRIC ASSN IS PRESENTLY CONSTRUCTING CRAIG 1 IN CRAIG, COLORADO. BOTH UNITS WILL FIRE PULVERIZED SUBBITUMINOUS COAL (0.45% S, 10,000 BTU/LB). THE EMISSION CONTROL SYSTEM FOR THIS UNIT WILL CONSIST OF A HOT SIDE ESP AND FOUR MAGNESIUM PROMOTED LIMESTONE SPRAY TOWERS FOR REMOVAL OF PARTICULATE MATTER AND 85% OF THE SO2. THE SCRUBBER EXHAUST WILL BE HEATED BY AN IN-LINE STEAM COIL REHEATER AND WILL PASS THROUGH A 600 FOOT ACID LINED STACK. THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP AND THE STABILIZED SLUDGE WILL BE DISPOSED OF IN AN OFF SITE MINEFILL. UNIT 1 START UP IS EXPECTED IN SEPTEMBER, 1980.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
COLORADO UTE ELECTRIC ASSN. CRAIG 2 NEW 447.0 MW (GROSS) 447.0 MW (ESC) COAL .45 %S SUBBITUMINOUS LIMESTONE PEABODY PROCESS SYSTEMS ENERGY CONSUMPTION: 5.4% STATUS 1 STARTUP 12/79	THE CRAIG 2 UNIT OF THE COLORADO UTE ELECTRIC ASSN IS LOCATED IN CRAIG, COLORADO AND FIRES PULVERIZED SUBBITUMINOUS COAL (0.45%S, 10,000 BTU/LB). THE EMISSION CONTROL SYSTEM FOR THIS UNIT CONSISTS OF A HOT SIDE ESP AND FOUR MAGNESIUM PROMOTED LIMESTONE SPRAY TOWERS FOR REMOVAL OF PARTICULATE MATTER AND 85% OF THE SO2. THE SCRUBBER EXHAUST IS HEATED BY AN IN-LINE STEAM COIL REHEATER AND PASSES THROUGH A 600 FOOT ACID BRICK LINED STACK. THE SYSTEM OPERATES IN A CLOSED LOOP, AND THE STABILIZED SLUDGE IS DISPOSED OF IN AN OFF SITE MINEFILL. START UP OF UNIT 2 WAS IN AUGUST, 1979.
COLORADO UTE ELECTRIC ASSN. CRAIG 3 NEW 447.0 MW (GROSS) 447.0 MW (ESC) COAL .45 %S SUBBITUMINOUS LIME/SPRAY DRYING BABCOCK & WILCOX ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 0/82	COLORADO UTE ELECTRIC ASSN. HAS PLANS FOR A NEW UNIT, CRAIG 3, TO BE LOCATED IN CRAIG, COLORADO ALONG WITH UNITS 1 AND 2. THE UNIT WILL FIRE PULVERIZED SUBBITUMINOUS COAL (0.45% S, 10,000 BTU/LB). A CONTRACT HAS BEEN AWARDED TO BABCOCK AND WILCOX FOR A DRY SCRUBBING SYSTEM UTILIZING LIME INJECTION. THE UNIT WILL HAVE A FABRIC FILTER FOR PARTICLE CONTROL. THE UNIT IS SCHEDULED TO COMMENCE OPERATIONS IN 1982.
COLUMBUS & SOUTHERN OHIO ELEC. CONESVILLE 5 NEW 411.0 MW (GROSS) 411.0 MW (ESC) COAL 4.67 %S BITUMINOUS LIME AIR CORRECTION DIVISION, UOP ENERGY CONSUMPTION: 3.9% STATUS 1 STARTUP 1/77	CONESVILLE 5 OF COLUMBUS AND SOUTHERN OHIO ELECTRIC IS A DRY BOTTOM, PULVERIZED BITUMINOUS COAL (4.67% S, 10,850 BTU/LB) FIRED UNIT LOCATED IN CONESVILLE, OHIO. A COLD SIDE ESP RECEIVES 1,393,893 ACFM OF FLUE GAS AND PASSES IT TO TWO THIOSORBIC LIME TCA MODULES SUPPLIED BY UOP. THE SO2 REMOVAL EFFICIENCY OF THE TWO MODULES, WHICH BEGAN INITIAL OPERATION IN JANUARY, 1977, IS 89.5% (DESIGN). EACH MODULE HAS ONE BULK ENTRAINMENT SEPARATOR AND TWO CHEVRON MIST ELIMINATORS. THE CLEANED GAS EXITS THROUGH AN 800 FOOT TALL ACID BRICK LINED STACK. THE POZ-O-TEC STABILIZED SLUDGE IS PUMPED INTO AN ON SITE DIKED LANDFILL. THE SYSTEM OPERATES IN AN OPEN WATER LOOP.
COLUMBUS & SOUTHERN OHIO ELEC. CONESVILLE 6 NEW 411.0 MW (GROSS) 411.0 MW (ESC) COAL 4.67 %S BITUMINOUS LIME AIR CORRECTION DIVISION, UOP ENERGY CONSUMPTION: 3.9% STATUS 1 STARTUP 6/78	CONESVILLE 6 OF COLUMBUS AND SOUTHERN OHIO ELECTRIC IS A DRY BOTTOM, PULVERIZED BITUMINOUS COAL (4.67% S, 10,850 BTU/LB) FIRED UNIT LOCATED IN CONESVILLE, OHIO. A COLD SIDE ESP RECEIVES 1,393,893 ACFM OF FLUE GAS AND PASSES IT TO TWO THIOSORBIC LIME TCA MODULES SUPPLIED BY UOP. THE SO2 REMOVAL EFFICIENCY OF THE TWO MODULES, WHICH BEGAN INITIAL OPERATION IN JUNE, 1978, IS 89.5% (DESIGN). EACH MODULE HAS ONE BULK ENTRAINMENT SEPARATOR AND TWO CHEVRON MIST ELIMINATORS. THE CLEANED GAS EXITS THROUGH AN 800 FOOT TALL ACID BRICK LINED STACK. THE POZ-O-TEC STABILIZED SLUDGE IS PUMPED INTO AN ON SITE DIKED LANDFILL. THE SYSTEM OPERATES IN AN OPEN WATER LOOP.
COLUMBUS & SOUTHERN OHIO ELEC. POSTON 5 NEW 425.0 MW (GROSS) 375.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: 4.7% STATUS 6 STARTUP 8/86	COLUMBUS AND SOUTHERN OHIO ELECTRIC HAS PLANS FOR TWO NEW UNITS, POSTON 5 AND 6, TO BE LOCATED IN ATHENS, OHIO. THE COAL (2.5% S, 11,000 BTU/LB) FIRED UNITS WILL UTILIZE EITHER A LIME, LIMESTONE, OR DUAL ALKALI FGD SYSTEM. START UP OF UNIT 5 IS EXPECTED IN 1986.
COLUMBUS & SOUTHERN OHIO ELEC. POSTON 6 NEW 425.0 MW (GROSS) 375.0 MW (ESC) COAL 2.50 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: 4.7% STATUS 6 STARTUP 0/89	COLUMBUS AND SOUTHERN OHIO ELECTRIC HAS PLANS FOR TWO NEW UNITS, POSTON 5 AND 6, TO BE LOCATED IN ATHENS, OHIO. THE COAL (2.5% S, 11,000 BTU/LB) FIRED UNITS WILL UTILIZE EITHER A LIME, LIMESTONE, OR DUAL ALKALI FGD SYSTEM. START UP OF UNIT 6 IS EXPECTED IN 1989.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
COMMONWEALTH EDISON POWERTON 51 RETROFIT 450.0 MW (GROSS) 450.0 MW (ESC) COAL 3.53 %S LIMESTONE AIR CORRECTION DIVISION, UOP ENERGY CONSUMPTION: 5.6% STATUS 1 STARTUP 4/80	COMMONWEALTH EDISON HAS RETROFITTED BOILER NUMBER 51 AT ITS POWERTON STATION WITH A UOP LIMESTONE FGD SYSTEM. UNIT 51 IS ONE OF TWO IDENTICAL BOILERS SUPPLYING STEAM TO AN 850 MW TURBINE. THE PULVERIZED COAL (3.53% S, 10,500 BTU/LB) FIRED BOILER FEEDS FLUE GAS THROUGH AN ESP TO 3 TCA MODULES WHICH ARE DESIGNED TO REMOVE 74% OF THE SO2. A STEAM INDIRECT HOT AIR REHEATER BOOSTS THE TEMPERATURE BEFORE THE GAS EXITS AN ACID BRICK LINED STACK. THE SYSTEM OPERATES IN A CLOSED WATER LOOP, AND THE SLUDGE IS POZ-O-TEC STABILIZED AND DISPOSED OF IN A LANDFILL. THE FGD SYSTEM COMMENCED OPERATION IN APRIL, 1980.
COOPERATIVE POWER ASSOCIATION COAL CREEK 1 NEW 545.0 MW (GROSS) 327.0 MW (ESC) COAL .63 %S LIGNITE LIME/ALKALINE FLYASH COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 8/79	COAL CREEK 1 AND 2 ARE TWO PULVERIZED LIGNITE (0.63% S, 6258 BTU/LB) FIRED UNITS OWNED BY THE COOPERATIVE POWER ASSN AND UNITED POWER. A COLD SIDE ESP RECEIVES 2,200,000 ACFM OF FLUE GAS AND EXHAUSTS IT TO FOUR COUNTER-CURRENT SPRAY TOWERS. MIST ELIMINATION IS PROVIDED BY A BULK ENTRAINMENT SEPARATOR AND TWO CHEVRON MIST ELIMINATORS. A MINIMUM OF 40% BYPASS REHEAT WILL BE PROVIDED BEFORE THE CLEANED GAS EXITS THE 650 FOOT ACID BRICK LINED STACK. THE TOWER DESIGN SO2 REMOVAL EFFICIENCY IS 90%. THE SYSTEM WILL OPERATE IN AN OPEN WATER LOOP, AND THE FLYASH STABILIZED SLUDGE WILL BE DISPOSED IN A CLAY LINED POND. UNIT 1 OPERATIONS BEGAN IN AUGUST 1979.
COOPERATIVE POWER ASSOCIATION COAL CREEK 2 NEW 545.0 MW (GROSS) 327.0 MW (ESC) COAL .63 %S LIGNITE LIME/ALKALINE FLYASH COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 7/80	COAL CREEK 1 AND 2 ARE TWO PULVERIZED LIGNITE (0.63% S, 6258 BTU/LB) FIRED UNITS OWNED BY THE COOPERATIVE POWER ASSN AND UNITED POWER. A COLD SIDE ESP RECEIVES 2,200,000 ACFM OF FLUE GAS AND EXHAUSTS IT TO FOUR COUNTER-CURRENT SPRAY TOWERS. MIST ELIMINATION IS PROVIDED BY A BULK ENTRAINMENT SEPARATOR AND TWO CHEVRON MIST ELIMINATORS. A MINIMUM OF 40% BYPASS REHEAT WILL BE PROVIDED BEFORE THE CLEANED GAS EXITS THE 650 FOOT ACID BRICK LINED STACK. THE TOWER DESIGN SO2 REMOVAL EFFICIENCY IS 90%. THE SYSTEM WILL OPERATE IN AN OPEN WATER LOOP, AND THE FLYASH STABILIZED SLUDGE WILL BE DISPOSED OF IN A CLAY LINED POND. UNIT 2 IS PRESENTLY UNDER CONSTRUCTION AND SHOULD INITIALLY START OPERATIONS IN JULY, 1980.
DELMARVA POWER & LIGHT DELAWARE CITY 1 RETROFIT 60.0 MW (GROSS) 60.0 MW (ESC) COKE 7.00 %S FLUID PETROLEUM COKE WELLMAN LORD DAVY MCKEE ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 5/80	DELAWARE CITY 1, 2, AND 3 OF DELMARVA POWER AND LIGHT ARE THREE RETROFITTED COKE (7-8% S) FIRED BOILERS WHICH HAVE A STEAM CAPACITY OF 500K LB/HR EACH. THE BOILERS GENERATE STEAM AS WELL AS ELECTRICITY FOR GETTY REFINING AND MARKETING. EACH BOILER SUPPLIES 295,000 ACFM OF FLUE GAS TO A MECHANICAL COLLECTOR THEN TO A VENTURI PARTICLE SCRUBBER FOR PARTICULATE CONTROL. THE FLUE GAS THEN PASSES THROUGH A CHEVRON TYPE MIST ELIMINATOR TO A WET ESP FOR BOTH PARTICULATE AND ACID MIST REMOVAL. A FOUR STAGE WELLMAN-LORD SYSTEM, WHICH IS DESIGN FOR 90% REMOVAL, IS USED FOR SO2 CONTROL. HOT AIR INJECTION REHEAT IS USED BEFORE THE GAS EXITS OUT A 500 FT. STACK. THE EMISSION CONTROL SYSTEM IS SUPPLIED BY DAVY MCKEE. IT IS A CLOSED LOOP WATER SYSTEM. IT WAS MADE OPERATIONAL IN MAY, 1980.
DELMARVA POWER & LIGHT DELAWARE CITY 2 RETROFIT 60.0 MW (GROSS) 60.0 MW (ESC) COKE 7.00 %S FLUID PETROLEUM COKE WELLMAN LORD DAVY MCKEE ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 5/80	DELAWARE CITY 1, 2, AND 3 OF DELMARVA POWER AND LIGHT ARE THREE RETROFITTED COKE (7-8% S) FIRED BOILERS WHICH HAVE A STEAM CAPACITY OF 500K LB/HR EACH. THE BOILERS GENERATE STEAM AS WELL AS ELECTRICITY FOR GETTY REFINING AND MARKETING. EACH BOILER SUPPLIES 295,000 ACFM OF FLUE GAS TO A MECHANICAL COLLECTOR THEN TO A VENTURI PARTICLE SCRUBBER FOR PARTICULATE CONTROL. THE FLUE GAS THEN PASSES THROUGH A CHEVRON TYPE MIST ELIMINATOR TO A WET ESP FOR BOTH PARTICULATE AND ACID MIST REMOVAL. A FOUR STAGE WELLMAN-LORD SYSTEM, WHICH IS DESIGN FOR 90% REMOVAL, IS USED FOR SO2 CONTROL. HOT AIR INJECTION REHEAT IS USED BEFORE THE GAS EXITS OUT A 500 FT. STACK. THE EMISSION CONTROL SYSTEM IS SUPPLIED BY DAVY MCKEE. IT IS A CLOSED LOOP WATER SYSTEM. IT WAS MADE OPERATIONAL IN MAY, 1980.
DELMARVA POWER & LIGHT DELAWARE CITY 3 RETROFIT 60.0 MW (GROSS) 60.0 MW (ESC) COKE 7.00 %S FLUID PETROLEUM COKE WELLMAN LORD DAVY MCKEE ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 5/80	DELAWARE CITY 1, 2, AND 3 OF DELMARVA POWER AND LIGHT ARE THREE RETROFITTED COKE (7-8% S) FIRED BOILERS WHICH HAVE A STEAM CAPACITY OF 500K LB/HR EACH. THE BOILERS GENERATE STEAM AS WELL AS ELECTRICITY FOR GETTY REFINING AND MARKETING. EACH BOILER SUPPLIES 295,000 ACFM OF FLUE GAS TO A MECHANICAL COLLECTOR THEN TO A VENTURI PARTICLE SCRUBBER FOR PARTICULATE CONTROL. THE FLUE GAS THEN PASSES THROUGH A CHEVRON TYPE MIST ELIMINATOR TO A WET ESP FOR BOTH PARTICULATE AND ACID MIST REMOVAL. A FOUR STAGE WELLMAN-LORD SYSTEM, WHICH IS DESIGN FOR 90% REMOVAL, IS USED FOR SO2 CONTROL. HOT AIR INJECTION REHEAT IS USED BEFORE THE GAS EXITS OUT A 500 FT. STACK. THE EMISSION CONTROL SYSTEM IS SUPPLIED BY DAVY MCKEE. IT IS A CLOSED LOOP WATER SYSTEM. IT WAS MADE OPERATIONAL IN MAY, 1980.

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UNIT IDENTIFICATION                                                   ABSTRACT
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DELMARVA POWER & LIGHT              DELMARVA POWER AND LIGHT IS PLANNING A NEW 550 MW (GROSS) UNIT, VIENNA 9,
VIENNA                              BE CONSTRUCTED IN VIENNA, MARYLAND.  THE UTILITY IS PRESENTLY CONSIDERING
9                                   A LIMESTONE FGD UNIT FOR EMISSION CONTROL.  THE PULVERIZED COAL FIRED UNIT
NEW        550.0 MW (GROSS)         WILL BURN COAL WITH AN AVERAGE SULFUR CONTENT OF 2.7% AND IS EXPECTED TO
           550.0 MW (ESC)           COMMENCE OPERATIONS IN JUNE 1987.
COAL
 2.70 %S
PROCESS NOT SELECTED
VENDOR NOT SELECTED
ENERGY CONSUMPTION: ****%
STATUS 6     STARTUP  6/87
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DESERET GEN & TRANS COOP            MOON LAKE 1 IS A PULVERIZED COAL (0.5% S, 10,500 BTU/LB) FIRED UNIT
MOON LAKE                           PLANNED BY DESERET GENERATION AND TRANSMISSION COOP TO BE LOCATED IN
1                                   VERNAL, UTAH.  THE UTILITY IS PRESENTLY REQUESTING BIDS FOR A WET LIME-
NEW        410.0 MW (GROSS)         STONE SCRUBBING SYSTEM HAVING A SO2 REMOVAL EFFICIENCY OF 95%.  THE SYSTEM
           410.0 MW (ESC)           WILL FEATURE A BAGHOUSE DESIGNED TO REMOVE 99.6% OF THE PARTICULATE.  THE
COAL                                UNIT WILL OPERATE IN A CLOSED WATER LOOP WITH SLUDGE DISPOSAL ON SITE
  .50 %S  BITUMINOUS                IN A LANDFILL.  OPERATIONS ARE SCHEDULED TO COMMENCE IN SEPTEMBER, 1984.
LIMESTONE
VENDOR NOT SELECTED
ENERGY CONSUMPTION: ****%
STATUS 5     STARTUP  9/84
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DESERET GEN & TRANS COOP            MOON LAKE 2 IS A PULVERIZED COAL (0.5% S, 10,500 BTU/LB) FIRED UNIT
MOON LAKE                           PLANNED BY DESERET GENERATION AND TRANSMISSION COOP TO BE LOCATED IN
2                                   VERNAL, UTAH.  THE UTILITY IS PRESENTLY REQUESTING BIDS FOR A WET LIME-
NEW        410.0 MW (GROSS)         STONE SCRUBBING SYSTEM HAVING A SO2 REMOVAL EFFICIENCY OF 95%.  THE SYSTEM
           410.0 MW (ESC)           WILL FEATURE A BAGHOUSE DESIGNED TO REMOVE 99.6% OF THE PARTICULATE.  THE
COAL                                UNIT WILL OPERATE IN A CLOSED WATER LOOP WITH SLUDGE DISPOSAL ON SITE
  .50 %S  BITUMINOUS                IN A LANDFILL.  OPERATIONS ARE SCHEDULED TO COMMENCE IN 1988.
LIMESTONE
VENDOR NOT SELECTED
ENERGY CONSUMPTION: ****%
STATUS 5     STARTUP  0/88
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DUQUESNE LIGHT                      ELRAMA 1-4 OF DUQUESNE LIGHT CONSISTS OF FOUR PULVERIZED COAL (2.2% S,
ELRAMA                              11,350 BTU/LB) FIRED UNITS LOCATED IN ELRAMA, PENNSYLVANIA. THE EMISSION
1-4                                 CONTROL SYSTEM ON THIS SITE CONSISTS OF AN ESP FOLLOWED BY A MECHANICAL
RETROFIT   510.0 MW (GROSS)         COLLECTOR AND FIVE VARIABLE THROAT VENTURI LIME ABSORBER MODULES SUPPLIED
           510.0 MW (ESC)           BY CHEMICO, WHICH ARE DESIGNED TO REMOVE 83% OF THE SO2 FROM THE FLUE GAS.
COAL                                THE CLEANED GAS PASSES THROUGH A DIRECT OIL FIRED REHEATER BEFORE EXITING
 2.20 %S                            A 400 FOOT ACID BRICK LINED STACK. THE SYSTEM OPERATES IN AN OPEN WATER
LIME                                LOOP, AND THE POZ-O-TEC STABILIZED SLUDGE IS HAULED TO AN OFF SITE LAND-
CHEMICO DIVISION, ENVIROTECH        FILL. THE SYSTEM HAS BEEN OPERATIONAL SINCE OCTOBER, 1975.
ENERGY CONSUMPTION:  3.5%
STATUS 1     STARTUP 10/75
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DUQUESNE LIGHT                      THE PHILLIPS POWER STATION OF DUQUESNE LIGHT CONSISTS OF SIX DRY BOTTOM
PHILLIPS                            PULVERIZED COAL (1.92% S, 11,350 BTU/LB) FIRED UNITS LOCATED IN SOUTH
1-6                                 HEIGHT, PENNSYLVANIA. PARTICULATE CONTROL IS ACCOMPLISHED BY SIX ESP/
RETROFIT   408.0 MW (GROSS)         MECHANICAL COLLECTOR COMBINATIONS (ONE/BOILER). ONE TWO STAGE AND THREE
           408.0 MW (ESC)           SINGLE STAGE VARIABLE THROAT VENTURI LIME FGD MODULES SUPPLIED BY CHEMICO
COAL                                ARE DESIGNED TO REMOVE 83% OF THE SO2 FROM THE FLUE GAS. TWO CHEVRON MIST
 1.92 %S  BITUMINOUS                ELIMINATORS/MODULE ARE FOLLOWED BY A DIRECT OIL FIRED REHEATER WHICH RAIS-
LIME                                ES THE GAS TEMPERATURE BY 20 DEG F BEFORE IT LEAVES VIA A 340 FOOT TALL
CHEMICO DIVISION, ENVIROTECH        ACID BRICK LINED STACK. THE SYSTEM OPERATES IN AN OPEN WATER LOOP, AND
ENERGY CONSUMPTION:  3.4%           THE POZ-O-TEC STABILIZED SLUDGE IS TRUCKED TO AN OFF SITE LANDFILL. THE
STATUS 1     STARTUP  7/73          SYSTEM HAS BEEN OPERATIONAL SINCE JULY, 1973.
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EAST KENTUCKY POWER COOP            THE EAST KENTUCKY POWER COOP HAS PLANS TO FIRE TWO NEW UNITS.  THE J.K.
J. K. SMITH                         SMITH UNITS 1 AND 2 WILL UTILIZE EITHER A DRY PROCESS OR A WET LIME
1                                   PROCESS FOR EMISSION CONTROL.  UNIT 1 IS EXPECTED TO START UP IN JANUARY,
NEW        650.0 MW (GROSS)         1985.
           650.0 MW (ESC)
COAL
***** %S
PROCESS NOT SELECTED
VENDOR NOT SELECTED
ENERGY CONSUMPTION: ****%
STATUS 6     STARTUP  1/85
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UNIT IDENTIFICATION	ABSTRACT
EAST KENTUCKY POWER COOP J. K. SMITH 2 NEW 650.0 MW (GROSS) 650.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 1/87	THE EAST KENTUCKY POWER COOP HAS PLANS TO FIRE TWO NEW UNITS. THE J.K. SMITH UNITS 1 AND 2 WILL UTILIZE EITHER A DRY PROCESS OR A WET LIME PROCESS FOR EMISSION CONTROL. UNIT 2 IS EXPECTED TO START UP IN JANUARY, 1987.
EAST KENTUCKY POWER COOP SPURLOCK 2 NEW 500.0 MW (GROSS) 500.0 MW (ESC) COAL 3.50 %S LIME ADL/COMBUSTION EQUIP ASSOCIATE ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 1/81	SPURLOCK 2 OF EAST KENTUCKY POWER COOPERATIVE IS A BALANCED DRAFT PULVERIZED COAL (3.5% S, 11,000 BTU/LB) FIRED UNIT UNDER CONSTRUCTION IN MAYSVILLE, KENTUCKY. THE EMISSION CONTROL SYSTEM WILL CONSIST OF AN ESP FOLLOWED BY AN ADL/COMBUSTION EQUIPMENT ASSOCIATES LIME FGD SYSTEM (90% DESIGN SO2 REMOVAL EFFICIENCY). FLUE GAS FROM UNIT ONE WILL BE USED TO REHEAT THE CLEANED GAS. THE SYSTEM, SLATED FOR START UP IN JANUARY, 1981, WILL EMPLOY A CLOSED WATER LOOP AND POZ-O-TEC SLUDGE STABILIZATION.
FLORIDA POWER & LIGHT MARTIN 3 NEW 800.0 MW (GROSS) 800.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 7 STARTUP 0/87	FLORIDA POWER AND LIGHT HAS PLANS FOR TWO NEW UNITS, MARTIN 3 AND 4 TO BE LOCATED IN MARTIN COUNTY, FLORIDA. THE PULVERIZED COAL FIRED BOILERS WILL HAVE A MW RATING OF 800 EACH. THE UTILITY IS CONSIDERING FGD AND ALTERNATIVE METHODS FOR EMISSION CONTROL. THE START UP FOR UNIT 3 IS PROJECTED FOR 1987.
FLORIDA POWER & LIGHT MARTIN 4 NEW 800.0 MW (GROSS) 800.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 7 STARTUP 0/89	FLORIDA POWER AND LIGHT HAS PLANS FOR TWO NEW UNITS, MARTIN 3 AND 4 TO BE LOCATED IN MARTIN COUNTY, FLORIDA. THE PULVERIZED COAL FIRED BOILERS WILL HAVE A MW RATING OF 800 EACH. THE UTILITY IS CONSIDERING FGD AND ALTERNATIVE METHODS FOR EMISSION CONTROL. THE START UP FOR UNIT 4 IS PROJECTED FOR 1989.
GENERAL PUBLIC UTILITIES COAL 1 NEW 625.0 MW (GROSS) 625.0 MW (ESC) COAL 3.50 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 12/92	GENERAL PUBLIC UTILITIES HAS PLANS TO CONSTRUCT A 625 MW UNIT, COAL 1. THE UTILITY IS PRESENTLY CONSIDERING ONLY FGD AS THE EMISSION CONTROL STRATEGY. THE COAL FIRED (3.5% S) UNIT IS SCHEDULED TO COMMENCE OPERATIONS IN 1992.
GENERAL PUBLIC UTILITIES COAL 2 NEW 625.0 MW (GROSS) 625.0 MW (ESC) COAL 3.50 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 5/94	GENERAL PUBLIC UTILITIES IS PLANNING TO CONSTRUCT A 625 MW UNIT, COAL 2. THE UTILITY IS PRESENTLY CONSIDERING ONLY FGD AS THE EMISSION CONTROL STRATEGY. THE COAL FIRED (3.5% S) UNIT IS SCHEDULED TO COMMENCE OPERATIONS IN 1994.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
GENERAL PUBLIC UTILITIES COAL 3 NEW 625.0 MW (GROSS) 625.0 MW (ESC) COAL 3.50 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 12/95	GENERAL PUBLIC UTILITIES IS PLANNING TO CONSTRUCT A 625 MW UNIT, COAL 3. THE UTILITY IS PRESENTLY CONSIDERING ONLY FGD AS THE EMISSION CONTROL STRATEGY. THE COAL FIRED (3.5% S) UNIT IS SCHEDULED TO COMMENCE OPERATIONS IN 1995.
GENERAL PUBLIC UTILITIES COAL 4 NEW 625.0 MW (GROSS) 625.0 MW (ESC) COAL 3.50 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 5/97	GENERAL PUBLIC UTILITIES HAS PLANS TO CONSTRUCT A 625 MW UNIT, COAL 4. THE UTILITY IS PRESENTLY CONSIDERING ONLY FGD AS THE EMISSION CONTROL STRATEGY. THE COAL FIRED (3.5% S) UNIT IS SCHEDULED TO COMMENCE OPERATIONS IN 1997.
GENERAL PUBLIC UTILITIES COHO 1 NEW 690.0 MW (GROSS) 690.0 MW (ESC) COAL 3.50 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: 9.4% STATUS 5 STARTUP 5/91	COHO 1 IS A 3.5% S COAL FIRED UNIT PLANNED BY GENERAL PUBLIC UTILITIES TO BE LOCATED IN ERIE, PENNSYLVANIA. PRESENTLY BIDS ARE BEING REQUESTED. THE UTILITY IS PRIMARILY CONSIDERING A LIME OR LIMESTONE NON-SLURRY TYPE FGD SYSTEM. OPERATIONS ARE SCHEDULED TO COMMENCE IN MAY, 1991.
GENERAL PUBLIC UTILITIES SEWARD 7 NEW 690.0 MW (GROSS) 690.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: 9.4% STATUS 5 STARTUP 5/87	GENERAL PUBLIC UTILITIES IS PLANNING A NEW UNIT, SEWARD 7, TO BE BUILT IN SEWARD, PENNSYLVANIA. THE UTILITY IS PRESENTLY REQUESTING BIDS FOR AN FGD SYSTEM, WITH NON-SLURRY TYPE LIME AND LIMESTONE SYSTEMS BEING THE PRIMARY CONSIDERATION. START UP IS EXPECTED IN MAY, 1987.
GRAND HAVEN BRD OF LIGHT & PWR J. B. SIMS 3 NEW 65.0 MW (GROSS) 65.0 MW (ESC) COAL 2.75 %S BITUMINOUS LIME BABCOCK & WILCOX ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 6/83	THE GRAND HAVEN BOARD OF LIGHT AND POWER'S J.B. SIMS 3 IS A PLANNED BITUMINOUS COAL (2.75% S, 11,000 BTU/LB) FIRED UNIT TO BE LOCATED IN GRAND HAVEN, MICHIGAN. A CONTRACT HAS BEEN AWARDED TO BABCOCK AND WILCOX TO SUPPLY TWO SPRAY TOWERS TO CONTROL SO2 EMISSIONS. EACH SCRUBBER SYSTEM WILL UTILIZE A CHEVRON MIST ELIMINATOR AND AN IN-LINE REHEATER. THE SLUDGE IS TO BE DISPOSED OF IN AN OFF SITE LANDFILL. OPERATIONS ARE TO COMMENCE IN JUNE, 1983.
HOOSIER ENERGY MEROM 1 NEW 490.0 MW (GROSS) 441.0 MW (ESC) COAL 3.50 %S LIMESTONE MITSUBISHI HEAVY INDUSTRIES ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 5/82	MEROM 1 AND 2 ARE TWO NEW UNITS BEING BUILT BY HOOSIER ENERGY IN SULLIVAN, INDIANA. THESE PULVERIZED COAL (3.5% S) FIRED UNITS WILL PRODUCE 1,732,000 ACFM OF FLUE GAS WHICH WILL BE CLEANED BY A COLD SIDE ESP UPSTREAM OF A MITSUBISHI LIMESTONE GRID TOWER ABSORBER (90% DESIGN SO2 REMOVAL). THE SYSTEM WILL UTILIZE BYPASS REHEAT AND A 700 FOOT STACK. THE SLUDGE WILL BE STABILIZED AND LANDFILLED, AND THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP MODE. START UP OF UNIT 1 IS SCHEDULED FOR MAY, 1982.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
HOOSIER ENERGY MEROM 2 NEW 490.0 MW (GROSS) 441.0 MW (ESC) COAL 3.50 %S LIMESTONE MITSUBISHI HEAVY INDUSTRIES ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 7/81	MEROM 1 AND 2 ARE TWO NEW UNITS BEING BUILT BY HOOSIER ENERGY IN SULLIVAN, INDIANA. THESE PULVERIZED COAL (3.5% S) FIRED UNITS WILL PRODUCE 1,732,000 ACFM OF FLUE GAS WHICH WILL BE CLEANED BY A COLD SIDE ESP UPSTREAM OF A MITSUBISHI LIMESTONE GRID TOWER ABSORBER (90% DESIGN SO2 REMOVAL). THE SYSTEM WILL UTILIZE BYPASS REHEAT AND A 700 FOOT STACK. THE SLUDGE WILL BE STABILIZED AND LANDFILLED, AND THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP MODE. START UP OF UNIT 2 IS SCHEDULED FOR JULY, 1981.
HOUSTON LIGHTING & POWER LIMESTONE 1 NEW 750.0 MW (GROSS) 750.0 MW (ESC) COAL 1.08 %S LIGNITE LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 2/85	HOUSTON LIGHTING AND POWER CO HAS PLANS FOR TWO NEW UNITS, LIMESTONE 1 AND 2, TO BE LOCATED IN JEWITT, TEXAS. THE PULVERIZED COAL (1.08% S, 6177 BTU/LB) FIRED BOILER WILL UTILIZE A WET LIMESTONE SCRUBBING PROCESS FOR PRIMARY SO2 COLLECTION. A COLD SIDE ESP WILL ALSO BE USED FOR PRIMARY PARTICLE CONTROL. THE UTILITY IS PRESENTLY REQUESTING/EVALUATING BIDS FOR THE FGD SYSTEM. UNIT 1 IS SCHEDULED TO COMMENCE OPERATIONS IN 1985.
HOUSTON LIGHTING & POWER LIMESTONE 2 NEW 750.0 MW (GROSS) 750.0 MW (ESC) COAL 1.08 %S LIGNITE LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 2/86	HOUSTON LIGHTING AND POWER CO HAS PLANS FOR TWO NEW UNITS, LIMESTONE 1 AND 2, TO BE LOCATED IN JEWITT, TEXAS. THE PULVERIZED COAL (1.08% S, 6177 BTU/LB) FIRED BOILER WILL UTILIZE A WET LIMESTONE SCRUBBING PROCESS FOR PRIMARY SO2 COLLECTION. A COLD SIDE ESP WILL ALSO BE USED FOR PRIMARY PARTICLE CONTROL. THE UTILITY IS PRESENTLY REQUESTING/EVALUATING BIDS FOR THE FGD SYSTEM. UNIT 2 IS SCHEDULED TO COMMENCE OPERATIONS IN 1986.
HOUSTON LIGHTING & POWER W.A. PARISH 8 NEW 600.0 MW (GROSS) 492.0 MW (ESC) COAL .60 %S SUBBITUMINOUS LIMESTONE CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 11/82	W.A. PARISH 8 OF HOUSTON LIGHTING & POWER IS A PULVERIZED COAL (0.6% S, 8700 BTU/LB) FIRED UNIT UNDER CONSTRUCTION IN THOMPSONS, TEXAS. CHEMICO WILL SUPPLY A LIMESTONE FGD SYSTEM WHICH WILL REMOVE 82% OF THE FLUE GAS SO2. REHEAT WILL BE PROVIDED BY BYPASSING 18% OF THE PARTICULATE CLEANED FLUE GAS. SLUDGE WILL BE DEWATERED, BLENDED WITH FLYASH, AND DISPOSED IN AN ON SITE LANDFILL. OPERATIONS ARE SCHEDULED TO COMMENCE IN NOVEMBER, 1982.
INDIANAPOLIS POWER & LIGHT PATRIOT 1 NEW 650.0 MW (GROSS) 650.0 MW (ESC) COAL 3.50 %S LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/87	INDIANAPOLIS POWER AND LIGHT HAS PLANS FOR THREE NEW UNITS, PATRIOT 1, 2, AND 3, TO BE LOCATED IN PATRIOT, INDIANA. THE UTILITY PLANS ON UTILIZING A LIMESTONE FGD PROCESS FOR EMISSION CONTROL.
INDIANAPOLIS POWER & LIGHT PATRIOT 2 NEW 650.0 MW (GROSS) 650.0 MW (ESC) COAL 3.50 %S LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/87	INDIANAPOLIS POWER AND LIGHT HAS PLANS FOR THREE NEW UNITS, PATRIOT 1, 2, AND 3, TO BE LOCATED IN PATRIOT, INDIANA. THE UTILITY PLANS ON UTILIZING A LIMESTONE FGD PROCESS FOR EMISSION CONTROL.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
INDIANAPOLIS POWER & LIGHT PATRIOT 3 NEW 650.0 MW (GROSS) 650.0 MW (ESC) COAL 3.50 %S LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/87	INDIANAPOLIS POWER AND LIGHT HAS PLANS FOR THREE NEW UNITS, PATRIOT 1, 2, AND 3, TO BE LOCATED IN PATRIOT, INDIANA. THE UTILITY PLANS ON UTILIZING A LIMESTONE FGD PROCESS FOR EMISSION CONTROL.
INDIANAPOLIS POWER & LIGHT PETERSBURG 3 NEW 532.0 MW (GROSS) 532.0 MW (ESC) COAL 3.25 %S BITUMINOUS LIMESTONE AIR CORRECTION DIVISION, UOP ENERGY CONSUMPTION: 2.4% STATUS 1 STARTUP 12/77	PETERSBURG 3 OF INDIANAPOLIS POWER AND LIGHT IS LOCATED IN PETERSBURG, INDIANA, AND BURNS 3.25% S BITUMINOUS COAL (11,000 BTU/LB). TWO COLD SIDE ESP'S ARE LOCATED UPSTREAM OF 4 85% EFFICIENT UOP LIMESTONE TCA MODULES. A HORIZONTAL MIST ELIMINATOR PRECEDES AN INDIRECT HOT AIR REHEATER THAT BOOSTS THE GAS TEMPERATURE BY 30 DEG F BEFORE IT EXITS THE 616 FOOT RIGI-FLAKE 4850 LINED STACK. STABILIZED SLUDGE IS DISPOSED IN AN ON SITE POND, AND THE SYSTEM OPERATES IN A CLOSED WATER LOOP MODE. THIS UNIT HAS BEEN OPERATIONAL SINCE DECEMBER, 1977.
INDIANAPOLIS POWER & LIGHT PETERSBURG 4 NEW 530.0 MW (GROSS) 530.0 MW (ESC) COAL 3.50 %S BITUMINOUS LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 2.1% STATUS 2 STARTUP 10/84	PETERSBURG 4 OF INDIANAPOLIS POWER AND LIGHT IS A BITUMINOUS COAL (3.50% S 11,000 BTU/LB) FIRED BOILER UNDER CONSTRUCTION IN PETERSBURG, INDIANA. THE LIMESTONE FGD SYSTEM FOR THIS UNIT WILL BE SUPPLIED BY RESEARCH COTTRELL. THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP, AND SLUDGE WILL BE POZ-O-TEC STABILIZED BEFORE PONDING. START UP IS SLATED FOR OCTOBER OF 1984.
IOWA ELECTRIC LIGHT & PWR GUTHRIE CO. 1 NEW 720.0 MW (GROSS) 720.0 MW (ESC) COAL .40 %S SUBBITUMINOUS LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 10/84	IOWA ELECTRIC LIGHT AND POWER HAS PLANS TO CONSTRUCT A 720 MW UNIT, GUTHRIE COUNTY 1, TO BE LOCATED IN PANORA, IOWA. THE PULVERIZED SUBBITUMINOUS COAL (0.4% S, 8180 BTU/LB) FIRED BOILER WILL UTILIZE A WET LIMESTONE SCRUBBING SYSTEM AND AN ESP FOR EMISSION CONTROL. THE CLEANED FLUE GAS WILL EXIT A 650 FOOT STACK. THE UTILITY STARTED REQUESTING/EVALUATING BIDS IN JANUARY, 1980 AND HAS PROJECTED THE STARTUP TO BE IN OCTOBER, 1984.
JACKSONVILLE ELECT. AUTHORITY NEW PROJECT 1 NEW 600.0 MW (GROSS) 600.0 MW (ESC) COAL 3.00 %S LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/85	THE JACKSONVILLE ELECTRIC AUTHORITY HAS PLANS FOR TWO NEW UNITS, NEW GENERATING PROJECT 1 AND 2, TO BE LOCATED IN EAST PORT, FLORIDA. EACH UNIT WILL BURN PULVERIZED COAL (2-4% S) AND SUPPLY 2,660,000 ACFM TO A WET LIMESTONE FGD PROCESS AND AN ESP FOR EMISSION CONTROL. THE CLEANED FLUE GAS IS TO EXIT A 285 FOOT STACK. UNIT 1 IS SCHEDULED TO COMMENCE OPERATIONS IN 1985.
JACKSONVILLE ELECT. AUTHORITY NEW PROJECT 2 NEW 600.0 MW (GROSS) 600.0 MW (ESC) COAL 3.00 %S LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/87	THE JACKSONVILLE ELECTRIC AUTHORITY HAS PLANS FOR TWO NEW UNITS, NEW GENERATING PROJECT 1 AND 2, TO BE LOCATED IN EAST PORT, FLORIDA. EACH UNIT WILL BURN PULVERIZED COAL (2-4% S) AND SUPPLY 2,660,000 ACFM TO A WET LIMESTONE FGD PROCESS AND AN ESP FOR EMISSION CONTROL. THE CLEANED FLUE GAS IS TO EXIT A 285 FOOT STACK. UNIT 2 IS SCHEDULED TO COMMENCE OPERATIONS IN 1987.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
KANSAS CITY POWER & LIGHT HAWTHORN 3 RETROFIT 90.0 MW (GROSS) 90.0 MW (ESC) COAL .60 %S BITUMINOUS LIME COMBUSTION ENGINEERING ENERGY CONSUMPTION: 2.2% STATUS 1 STARTUP 11/72	HAWTHORN 3 OF KANSAS CITY POWER AND LIGHT IS A DRY BOTTOM PULVERIZED BITUMINOUS COAL (0.6% S, 9800 BTU/LB) FIRED UNIT LOCATED IN KANSAS CITY, MISSOURI, WHICH WAS CONVERTED FROM LIMESTONE FURNACE INJECTION AND TAIL END SCRUBBING TO A LIME SLURRY SYSTEM. TWO COMBUSTION ENGINEERING MARBLE BED ABSORBERS, WHICH WERE DESIGNED TO REMOVE 70% OF THE FLUE GAS SO2, BEGAN OPERATION IN JANUARY, 1977. ONE HORIZONTAL CHEVRON MIST ELIMINATOR PER MODULE IS UPSTREAM OF AN IN-LINE FINNED TUBE REHEATER, WHICH RAISES THE TEMPERATURE OF THE CLEANED GAS BEFORE IT EXITS THROUGH A GUNITE LINED 200 FOOT STACK. THE FLYASH STABILIZED SLUDGE IS DEPOSITED IN AN UNLINED SLUDGE POND. THE SYSTEM OPERATES IN A CLOSED WATER LOOP MODE.
KANSAS CITY POWER & LIGHT HAWTHORN 4 RETROFIT 90.0 MW (GROSS) 90.0 MW (ESC) COAL .60 %S BITUMINOUS LIME COMBUSTION ENGINEERING ENERGY CONSUMPTION: 2.2% STATUS 1 STARTUP 8/72	HAWTHORN 4 OF KANSAS CITY POWER AND LIGHT IS A DRY BOTTOM PULVERIZED BITUMINOUS COAL (0.6% S, 9800 BTU/LB) FIRED UNIT LOCATED IN KANSAS CITY, MISSOURI, WHICH WAS CONVERTED FROM LIMESTONE FURNACE INJECTION AND TAIL END SCRUBBING TO A LIME SLURRY SYSTEM. TWO COMBUSTION ENGINEERING MARBLE BED ABSORBERS, WHICH WERE DESIGNED TO REMOVE 70% OF THE FLUE GAS SO2, BEGAN OPERATION IN JANUARY, 1977. ONE HORIZONTAL CHEVRON MIST ELIMINATOR PER MODULE IS UPSTREAM OF AN IN-LINE FINNED TUBE REHEATER, WHICH RAISES THE TEMPERATURE OF THE CLEANED GAS BEFORE IT EXITS THROUGH A GUNITE LINED 200 FOOT STACK. THE FLYASH STABILIZED SLUDGE IS DEPOSITED IN AN UNLINED SLUDGE POND. THE SYSTEM OPERATES IN A CLOSED WATER LOOP MODE.
KANSAS CITY POWER & LIGHT LA CYGNE 1 NEW 874.0 MW (GROSS) 874.0 MW (ESC) COAL 5.39 %S SUBBITUMINOUS LIMESTONE BABCOCK & WILCOX ENERGY CONSUMPTION: 2.7% STATUS 1 STARTUP 2/73	LA CYGNE 1 IS A WET BOTTOM, CYCLONE FIRED PULVERIZED SUBBITUMINOUS COAL (5.39% S, 9421 BTU/LB) FIRED UNIT OF KANSAS CITY POWER AND LIGHT, LOCATED IN LA CYGNE, KANSAS. THE EMISSION CONTROL SYSTEM CONSISTS OF EIGHT VARIABLE THROAT VENTURI/LIMESTONE SIEVE TRAY TOWER TRAINS SUPPLIED BY BABCOCK AND WILCOX. EACH 80% (SO2 REMOVAL, DESIGN) EFFICIENT TRAIN IS FOLLOWED BY A COMBINATION SIEVE TRAY AND CHEVRON MIST ELIMINATOR, FOLLOWED BY AN INDIRECT REHEATER. THE CLEANED GAS EXITS THROUGH A 700 FOOT STEEL LINED STACK. THE SYSTEM OPERATES IN A CLOSED WATER LOOP, AND THE SCRUBBER SLUDGE IS DISPOSED IN AN UNLINED POND. INITIAL OPERATIONS OF THE FGD SYSTEM BEGAN IN FEBRUARY, 1973.
KANSAS POWER & LIGHT JEFFREY 1 NEW 720.0 MW (GROSS) 540.0 MW (ESC) COAL .32 %S LIMESTONE COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 8/78	KANSAS CITY POWER AND LIGHT'S JEFFREY 1 IS A TANGENTIAL FIRED PULVERIZED COAL (0.32% S, 8125 BTU/LB) UNIT IN WAMEGO, KANSAS. THE EMISSION CONTROL SYSTEM FOR THIS UNIT CONSISTS OF A COLD SIDE ESP FOLLOWED BY SIX (ONE SPARE) LIMESTONE SPRAY TOWER MODULES SUPPLIED BY COMBUSTION ENGINEERING. THE DESIGN SO2 REMOVAL EFFICIENCY IS 50% (INCLUDING A 30% BYPASS REHEAT). THE UNIT HAS BEEN OPERATIONAL SINCE AUGUST, 1978.
KANSAS POWER & LIGHT JEFFREY 2 NEW 700.0 MW (GROSS) 490.0 MW (ESC) COAL .30 %S LIMESTONE COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 4/80	UNIT 2, PRESENTLY OPERATING AT KANSAS POWER AND LIGHT'S JEFFREY ENERGY CENTER IN JEFFREY, KANSAS, BURNS 0.3% S PULVERIZED COAL (8100 BTU/LB). THIS UNIT'S EMISSION CONTROL SYSTEM CONSISTS OF A COLD SIDE ESP AND COMBUSTION ENGINEERING LIMESTONE SPRAY TOWERS. A 30% FLUE GAS BYPASS PROVIDES REHEAT OF THE CLEANED GAS BEFORE IT EXITS THROUGH A 600 FOOT STACK. THE SYSTEM OPERATES IN A CLOSED WATER LOOP MODE, AND THE SLUDGE IS STABILIZED WITH BOTTOM ASH AND PIPED TO AN ON-SITE CLAY LINED POND. INITIAL OPERATIONS COMMENCED IN JANUARY, 1980.
KANSAS POWER & LIGHT LAWRENCE 4 RETROFIT 125.0 MW (GROSS) 125.0 MW (ESC) COAL .55 %S LIMESTONE COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 1/76	LAWRENCE 4 OF KANSAS POWER AND LIGHT IS A BALANCED DRAFT, TANGENTIAL FIRED PULVERIZED COAL (0.55% S, 10,000 BTU/LB) UNIT LOCATED IN LAWRENCE, KANSAS. A NEW COMBUSTION ENGINEERING LIMESTONE ROD DECK/SPRAY TOWER SYSTEM REPLACED THE EXISTING MARBLE BED TAIL END SCRUBBER IN JANUARY, 1977. THE SYSTEM TREATS 403,000 ACFM OF FLUE GAS, WITH A DESIGN SO2 REMOVAL OF 73%. MIST ELIMINATION IS ACCOMPLISHED BY TWO CHEVRONS AND ONE BULK ENTRAINMENT SEPARATOR FOLLOWING EACH OF THE TWO MODULES. A FINNED TUBE REHEATER BOOSTS THE TEMPERATURE OF THE CLEANED GAS BY 20 DEG F BEFORE IT IS EXHAUSTED THROUGH A 120 FOOT STACK. THE SLUDGE IS DISPOSED IN AN UNLINED INTERIM POND, WHICH OVERFLOWS INTO A FINAL DISPOSAL POND. THE SYSTEM OPERATES IN A CLOSED WATER LOOP.

UNIT IDENTIFICATION	ABSTRACT
KANSAS POWER & LIGHT LAWRENCE 5 RETROFIT 420.0 MW (GROSS) 420.0 MW (ESC) COAL .55 %S LIMESTONE COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 11/71	LAWRENCE 5 OF KANSAS POWER AND LIGHT IS A BALANCED DRAFT, TANGENTIAL FIRED PULVERIZED COAL (0.55% S, 10,000 BTU/LB) UNIT LOCATED IN LAWRENCE, KANSAS. A NEW COMBUSTION ENGINEERING LIMESTONE ROD DECK/SPRAY TOWER SYSTEM REPLACED THE EXISTING MARBLE BED TAIL END SCRUBBER IN APRIL, 1978. THE SYSTEM TREATS 403,000 ACFM OF FLUE GAS, WITH A DESIGN SO2 REMOVAL OF 73%. MIST ELIMINATION IS ACCOMPLISHED BY TWO CHEVRONS AND ONE BULK ENTRAINMENT SEPARATOR FOLLOWING EACH OF THE TWO MODULES. A FINNED TUBE REHEATER BOOSTS THE TEMPERATURE OF THE CLEANED GAS BY 20 DEG F BEFORE IT IS EXHAUSTED THROUGH A 120 FOOT STACK. THE SLUDGE IS DISPOSED IN AN UNLINED INTERIM POND, WHICH OVERFLOWS INTO A FINAL DISPOSAL POND. THE SYSTEM OPERATES IN A CLOSED WATER LOOP.
KENTUCKY UTILITIES GREEN RIVER 1-3 RETROFIT 64.0 MW (GROSS) 64.0 MW (ESC) COAL 4.00 %S BITUMINOUS LIME AMERICAN AIR FILTER ENERGY CONSUMPTION: 3.1% STATUS 1 STARTUP 9/75	GREEN RIVER 1-3 OF KENTUCKY UTILITIES ARE THREE DRY BOTTOM PULVERIZED BITUMINOUS COAL (4% S, 11,000 BTU/LB) FIRED UNITS LOCATED IN CENTRAL CITY, KENTUCKY. EACH BOILER SUPPLIES 360,000 ACFM OF FLUE GAS TO A VARIABLE THROAT VENTURI FOLLOWED BY AN AMERICAN AIR FILTER LIME MOBILE BED CONTACTOR (80% DESIGN SO2 REMOVAL EFFICIENCY). A RADIAL VANE MIST ELIMINATOR IS FOLLOWED BY A STEAM TUBE REHEATER AND A 165 FOOT STACK. SLUDGE IS DISPOSED IN AN ON-SITE UNLINED POND, AND THE SYSTEM OPERATES IN A CLOSED WATER LOOP. THE SYSTEM HAS BEEN OPERATIONAL SINCE SEPTEMBER, 1975.
LAKELAND UTILITIES MCINTOSH 3 NEW 364.0 MW (GROSS) 364.0 MW (ESC) COAL 2.56 %S BITUMINOUS LIMESTONE BABCOCK & WILCOX ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 8/81	MCINTOSH 3 OF LAKELAND UTILITIES IS BEING CONSTRUCTED IN LAKELAND, FLORIDA. BABCOCK AND WILCOX HAS BEEN AWARDED A CONTRACT TO SUPPLY AN 85% EFFICIENT (SO2) LIMESTONE FGD SYSTEM FOR THIS UNIT. THE EMISSION CONTROL SYSTEM WILL CONSIST OF A COLD SIDE ESP FOLLOWED BY TWO PARALLEL FGD MODULES AND A 250 FOOT ACID BRICK LINED STACK. THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP, AND THE POZ-O-TEC STABILIZED SLUDGE WILL BE USED AS A CONSTRUCTION BASE. CONSTRUCTION BEGAN IN NOVEMBER, 1979 AND START UP IS SCHEDULED TO BE IN AUGUST, 1981.
LANSING BOARD OF WATER & LIGHT ERICKSON 2 NEW 160.0 MW (GROSS) 160.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 1/87	THE ERICKSON 2 STATION OF THE LANSING BOARD OF WATER AND LIGHT IS A PLANNED UNIT TO BE LOCATED IN DELTA TOWNSHIP, MICHIGAN. THE UNIT WILL HAVE A MW RATING OF BETWEEN 160 AND 250, DEPENDING ON WHETHER OTHER MUNICIPALITIES WILL JOIN IN THIS PROJECT. THE UTILITY IS PRESENTLY CONSIDERING THE USE OF FGD FOR EMISSION CONTROL. OPERATIONS ARE SCHEDULED TO COMMENCE IN 1987.
LOS ANGELES DEPT OF WTR & PWR INTERMOUNTAIN 1 NEW 820.0 MW (GROSS) 820.0 MW (ESC) COAL .79 %S SUBBITUMINOUS LIME VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 7/86	THE LOS ANGELES DEPARTMENT OF WATER AND POWER HAVE PLANS FOR FOUR NEW BOILERS, INTERMOUNTAIN 1, 2, 3 AND 4, TO BE LOCATED IN DELTA, UTAH. EACH 820 MW BOILER WILL FIRE PULVERIZED COAL (0.79% S, 10,200 BTU/LB) AND WILL SUPPLY 5,400,000 ACFM OF FLUE GAS TO A WET LIME SCRUBBING SYSTEM. A HORIZONTAL WEIR TYPE SCRUBBER ALONG WITH A HOT SIDE ESP IS UNDER CONSIDERATION BY THE UTILITY FOR EMISSION CONTROL. THE CLEANED FLUE GAS WILL EXIT A 750 FOOT STACK. UNIT 1 IS SCHEDULED TO COMMENCE OPERATIONS IN 1986.
LOS ANGELES DEPT OF WTR & PWR INTERMOUNTAIN 2 NEW 820.0 MW (GROSS) 820.0 MW (ESC) COAL .79 %S SUBBITUMINOUS LIME VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 7/87	THE LOS ANGELES DEPARTMENT OF WATER AND POWER HAVE PLANS FOR FOUR NEW BOILERS, INTERMOUNTAIN 1, 2, 3 AND 4, TO BE LOCATED IN DELTA, UTAH. EACH 820 MW BOILER WILL FIRE PULVERIZED COAL (0.79% S, 10,200 BTU/LB) AND WILL SUPPLY 5,400,000 ACFM OF FLUE GAS TO A WET LIME SCRUBBING SYSTEM. A HORIZONTAL WEIR TYPE SCRUBBER ALONG WITH A HOT SIDE ESP IS UNDER CONSIDERATION BY THE UTILITY FOR EMISSION CONTROL. THE CLEANED FLUE GAS WILL EXIT A 750 FOOT STACK. UNIT 2 IS SCHEDULED TO COMMENCE OPERATIONS IN 1987.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
LOS ANGELES DEPT OF WTR & PWR INTERMOUNTAIN 3 NEW 820.0 MW (GROSS) 820.0 MW (ESC) COAL .79 %S SUBBITUMINOUS LIME VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/88	THE LOS ANGELES DEPARTMENT OF WATER AND POWER HAVE PLANS FOR FOUR NEW BOILERS, INTERMOUNTAIN 1, 2, 3 AND 4, TO BE LOCATED IN DELTA, UTAH. EACH 820 MW BOILER WILL FIRE PULVERIZED COAL (0.79% S, 10,200 BTU/LB) AND WILL SUPPLY 5,400,000 ACFM OF FLUE GAS TO A WET LIME SCRUBBING SYSTEM. A HORIZONTAL WEIR TYPE SCRUBBER ALONG WITH A HOT SIDE ESP IS UNDER CONSIDERATION BY THE UTILITY FOR EMISSION CONTROL. THE CLEANED FLUE GAS WILL EXIT A 750 FOOT STACK. UNIT 3 IS SCHEDULED TO COMMENCE OPERATIONS IN 1988.
LOS ANGELES DEPT OF WTR & PWR INTERMOUNTAIN 4 NEW 820.0 MW (GROSS) 820.0 MW (ESC) COAL .79 %S SUBBITUMINOUS LIME VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/89	THE LOS ANGELES DEPARTMENT OF WATER AND POWER HAVE PLANS FOR FOUR NEW BOILERS, INTERMOUNTAIN 1, 2, 3 AND 4, TO BE LOCATED IN DELTA, UTAH. EACH 820 MW BOILER WILL FIRE PULVERIZED COAL (0.79% S, 10,200 BTU/LB) AND WILL SUPPLY 5,400,000 ACFM OF FLUE GAS TO A WET LIME SCRUBBING SYSTEM. A HORIZONTAL WEIR TYPE SCRUBBER ALONG WITH A HOT SIDE ESP IS UNDER CONSIDERATION BY THE UTILITY FOR EMISSION CONTROL. THE CLEANED FLUE GAS WILL EXIT A 750 FOOT STACK. UNIT 4 IS SCHEDULED TO COMMENCE OPERATIONS IN 1989.
LOUISVILLE GAS & ELECTRIC CANE RUN 4 RETROFIT 188.0 MW (GROSS) 188.0 MW (ESC) COAL 3.75 %S BITUMINOUS LIME AMERICAN AIR FILTER ENERGY CONSUMPTION: 1.6% STATUS 1 STARTUP 8/76	UNIT 4 AT LOUISVILLE GAS AND ELECTRIC'S CANE RUN STATION IS A PULVERIZED BITUMINOUS COAL (3.75% S, 11,500 BTU/LB) FIRED UNIT IN LOUISVILLE, KENTUCKY. AN ESP AND TWO AMERICAN AIR FILTER CARBIDE LIME MOBILE BED ABSORBER MODULES (85% DESIGN SO2 REMOVAL) TREAT 734,000 ACFM OF FLUE GAS FROM THE BOILER. TWO CHEVRON MIST ELIMINATORS/MODULE ARE FOLLOWED BY A DIRECT COMBUSTION REHEATER AND A 250 FOOT STACK. THE WATER LOOP IS OPEN, AND THE SLUDGE IS DISPOSED IN AN ON-SITE LINED POND. THIS RETROFIT SYSTEM HAS BEEN OPERATIONAL SINCE AUGUST, 1976.
LOUISVILLE GAS & ELECTRIC CANE RUN 5 RETROFIT 200.0 MW (GROSS) 200.0 MW (ESC) COAL 3.75 %S BITUMINOUS LIME COMBUSTION ENGINEERING ENERGY CONSUMPTION: 1.5% STATUS 1 STARTUP 12/77	CANE RUN 5 OF LOUISVILLE GAS AND ELECTRIC IS A PULVERIZED BITUMINOUS COAL (3.75% S, 11,500 BTU/LB) FIRED UNIT LOCATED IN LOUISVILLE, KENTUCKY. THE BOILER SUPPLIES 700,000 ACFM OF FLUE GAS TO AN EMISSION CONTROL SYSTEM CONSISTING OF AN ESP FOLLOWED AND TWO COMBUSTION ENGINEERING 85% EFFICIENT (DESIGN) CARBIDE LIME SPRAY TOWERS. A STEAM TUBE REHEATER RAISES THE GAS TEMPERATURE 40 DEG F. THE SYSTEM OPERATES IN AN OPEN WATER LOOP MODE, AND THE SLUDGE IS POZ-O-TEC STABILIZED. OPERATION OF THIS RETROFIT SYSTEM BEGAN IN DECEMBER, 1977.
LOUISVILLE GAS & ELECTRIC CANE RUN 6 RETROFIT 299.0 MW (GROSS) 299.0 MW (ESC) COAL 4.80 %S BITUMINOUS DUAL ALKALI ADL/COMBUSTION EQUIP ASSOCIATE ENERGY CONSUMPTION: 1.0% STATUS 1 STARTUP 4/79	LOUISVILLE GAS AND ELECTRIC'S CANE RUN 6 IS A PULVERIZED BITUMINOUS COAL (4.80% S, 11,500 BTU/LB) FIRED UNIT IN LOUISVILLE, KENTUCKY. ADL/COMBUSTION EQUIPMENT ASSOCIATES SUPPLIED A RETROFIT DUAL ALKALI DEMONSTRATION FGD SYSTEM FOR THIS UNIT. THE EMISSION CONTROL SYSTEM, DESIGNED TO REMOVE 95% OF THE FLUE GAS SO2, CONSISTS OF A COLD SIDE ESP AND TWO TRAY TOWER MODULES. THE CLEANED GAS PASSES THROUGH A CHEVRON MIST ELIMINATOR AND TWO DIRECT COMBUSTION REHEATERS BEFORE EXITING A 518 FOOT STACK. THE WATER LOOP IS OPEN, AND THE SLUDGE IS DISPOSED IN AN ON-SITE CLAY LINED POND. FOR A ONE YEAR PERIOD FOLLOWING THE FIRST QUARTER OF OPERATION (WHICH BEGAN IN APRIL, 1979), THE U.S.EPA WILL SUBSIDIZE A MAX OF $4.5 MM FOR OPERATION, R&D, AND REPORT WRITING (NOT APPLIED TO ANY CAPITAL EXPENDITURES).
LOUISVILLE GAS & ELECTRIC MILL CREEK 1 RETROFIT 358.0 MW (GROSS) 358.0 MW (ESC) COAL 3.75 %S LIME COMBUSTION ENGINEERING ENERGY CONSUMPTION: 1.4% STATUS 2 STARTUP 12/80	MILL CREEK 1 OF LOUISVILLE GAS AND ELECTRIC IS LOCATED IN LOUISVILLE, KENTUCKY. A RETROFIT LIME/LIMESTONE FGD SYSTEM IS PRESENTLY UNDER CONSTRUCTION ON THIS PULVERIZED COAL (3.75% S, 11,500 BTU/LB) FIRED UNIT. COMBUSTION ENGINEERING IS SUPPLYING THE LIME/LIMESTONE FGD SYSTEM WHICH WILL COMPLY WITH LOCAL EMISSION STANDARDS BY APRIL OF 1981.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
LOUISVILLE GAS & ELECTRIC MILL CREEK 2 RETROFIT 350.0 MW (GROSS) 350.0 MW (ESC) COAL 3.75 %S LIME COMBUSTION ENGINEERING ENERGY CONSUMPTION: 1.4% STATUS 2 STARTUP 12/81	MILL CREEK 2 OF LOUISVILLE GAS AND ELECTRIC IS LOCATED IN LOUISVILLE, KENTUCKY. A RETROFIT LIME/LIMESTONE FGD SYSTEM IS PRESENTLY UNDER CONSTRUCTION ON THIS PULVERIZED COAL (3.75% S, 11,500 BTU/LB) FIRED UNIT. COMBUSTION ENGINEERING IS SUPPLYING THE LIME/LIMESTONE FGD SYSTEM WHICH WILL COMPLY WITH LOCAL EMISSION STANDARDS BY APRIL OF 1982.
LOUISVILLE GAS & ELECTRIC MILL CREEK 3 NEW 442.0 MW (GROSS) 442.0 MW (ESC) COAL 3.75 %S BITUMINOUS LIME AMERICAN AIR FILTER ENERGY CONSUMPTION: 1.6% STATUS 1 STARTUP 8/78	LOUISVILLE GAS AND ELECTRIC'S MILL CREEK 3 IS A 3.75% S COAL (11,500 BTU/LB) FIRED UNIT LOCATED IN LOUISVILLE, KENTUCKY. AMERICAN AIR FILTER SUPPLIED A CARBIDE LIME FGD SYSTEM FOR THIS UNIT WHICH WAS DESIGNED TO REMOVE 85% OF THE SO2 FROM THE FLUE GAS. AN ESP IS FOLLOWED BY FOUR MOBILE BED SPRAY TOWERS AND A STEAM TUBE REHEATER. THE WATER LOOP IS OPEN, AND THE FLYASH AND LIME STABILIZED SLUDGE IS PONDED. THIS UNIT HAS BEEN OPERATIONAL SINCE AUGUST, 1978.
LOUISVILLE GAS & ELECTRIC MILL CREEK 4 NEW 530.0 MW (GROSS) 495.0 MW (ESC) COAL 3.75 %S LIME AMERICAN AIR FILTER ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 7/81	MILL CREEK 4 OF LOUISVILLE GAS AND ELECTRIC IS A PULVERIZED BITUMINOUS COAL (3.75% S, 11,500 BTU/LB) FIRED UNIT UNDER CONSTRUCTION IN LOUISVILLE, KENTUCKY. THE EMISSION CONTROL SYSTEM WILL CONSIST OF AN ESP AND FOUR MOBILE BED SPRAY TOWERS. THE SYSTEM'S WATER LOOP WILL BE CLOSED, AND THE SLUDGE WILL BE STABILIZED WITH LIME AND FLYASH. STEAM TUBES WILL PROVIDE REHEAT OF THE CLEANED GASES. THE SYSTEM IS SCHEDULED TO START UP IN JULY OF 1981.
LOUISVILLE GAS & ELECTRIC PADDY'S RUN 5 RETROFIT 72.0 MW (GROSS) 72.0 MW (ESC) COAL 2.50 %S BITUMINOUS LIME COMBUSTION ENGINEERING ENERGY CONSUMPTION: 2.8% STATUS 1 STARTUP 4/73	UNIT 6 AT LOUISVILLE GAS AND ELECTRIC'S PADDY'S RUN STATION IS A DRY BOTTOM PULVERIZED COAL (2.5% S, 11,500 BTU/LB) FIRED UNIT IN LOUISVILLE, KENTUCKY. A RETROFIT CARBIDE LIME FGD SYSTEM BY COMBUSTION ENGINEERING TREATS 400,000 ACFM OF FLUE GAS FROM THE BOILER. AN ESP IS FOLLOWED BY TWO MARBLE BED ABSORBERS, A DIRECT COMBUSTION REHEATER, AND A 250 FOOT STACK. MIST ELIMINATION IS PROVIDED BY ONE CHEVRON/MODULE. THE LIME FIXATED SLUDGE IS TRUCKED TO AN UNLINED POND, AND THE WATER LOOP IS CLOSED. THE FGD SYSTEM BEGAN INITIAL OPERATIONS IN APRIL, 1973.
LOUISVILLE GAS & ELECTRIC TRIMBLE COUNTY 1 NEW 575.0 MW (GROSS) 575.0 MW (ESC) COAL 4.00 %S BITUMINOUS PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 7/85	LOUISVILLE GAS AND ELECTRIC WILL BE INSTALLING FGD SYSTEMS ON TWO OF THE FOUR BOILERS AT THE UTILITY'S PLANNED TRIMBLE COUNTY STATION IN BEDFORD, KENTUCKY. THE PULVERIZED 4% S (IF NO COAL WASH IS INCLUDED) COAL FIRED UNITS' FLUE GAS WILL BE CLEANED BY ESP'S AND WET SCRUBBING (90% REMOVAL EFFICIENCY). SLUDGE DISPOSAL STRATEGY IS UNDECIDED. UNIT 1 IS SCHEDULED FOR START UP IN JULY OF 1984.
LOUISVILLE GAS & ELECTRIC TRIMBLE COUNTY 2 NEW 575.0 MW (GROSS) 575.0 MW (ESC) COAL 4.00 %S BITUMINOUS PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 7/88	LOUISVILLE GAS AND ELECTRIC WILL BE INSTALLING FGD SYSTEMS ON TWO OF THE FOUR BOILERS AT THE UTILITY'S PLANNED TRIMBLE COUNTY STATION IN BEDFORD, KENTUCKY. THE PULVERIZED 4% S (IF NO COAL WASH IS INCLUDED) COAL FIRED UNITS' FLUE GAS WILL BE CLEANED BY ESP'S AND WET SCRUBBING (90% REMOVAL EFFICIENCY). SLUDGE DISPOSAL STRATEGY IS UNDECIDED. UNIT 2 IS SCHEDULED FOR START UP IN 1986.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
MARQUETTE BOARD OF LIGHT & PWR SHIRAS 3 NEW 44.0 MW (GROSS) 44.0 MW (ESC) COAL ***** %S LIME/SPRAY DRYING VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 10/82	SHIRAS 3 OF THE MARQUETTE BOARD OF LIGHT AND POWER IS A PULVERIZED COAL FIRED BOILER PLANNED FOR LOCATION IN MARQUETTE, MICHIGAN. PRESENTLY, THE UTILITY IS REQUESTING BIDS FOR A DRY LIME SCRUBBING PROCESS TO CONTROL EMISSIONS. THE UTILITY WILL UTILIZE A FABRIC FILTER TO OBTAIN A PARTICLE REMOVAL EFFICIENCY OF 99.8%. THE UNIT IS SCHEDULED TO COMMENCE OPERATIONS IN OCTOBER, 1982.
MICHIGAN S. CENTRAL PWR AGENCY PROJECT 1 NEW 55.0 MW (GROSS) 55.0 MW (ESC) COAL 2.25 %S LIMESTONE BABCOCK & WILCOX ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 4/82	THE PROJECT 1 UNIT OF MICHIGAN SOUTH CENTRAL POWER AGENCY IS TO BE CONSTRUCTED IN LITCHFIELD, MICHIGAN, AND WILL UTILIZE A WET LIMESTONE FGD PROCESS. THE PULVERIZED COAL FIRED BOILER WILL FEED ITS FLUE GAS THROUGH A HOT SIDE ESP FOLLOWED BY A BABCOCK AND WILCOX LIMESTONE SPRAY TOWER. THE CLEANED GAS WILL PASS THROUGH A MIST ELIMINATOR BEFORE BEING WARMED BY AN IN-LINE REHEATER AND EXITING A 250 FOOT STACK. THE SLUDGE IS TO BE DISPOSED OFF SITE. START UP IS SCHEDULED FOR APRIL, 1982.
MIDDLE SOUTH UTILITIES ARKANSAS LIGNITE 5 NEW 890.0 MW (GROSS) 890.0 MW (ESC) COAL .50 %S LIGNITE PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 4 STARTUP 1/86	UNIT 1 OF THE ARKANSAS ENERGY LIGNITE CENTER IS A LIGNITE (.5% S) FIRED BOILER. MIDDLE SOUTH UTILITIES HAS SIGNED A LETTER OF INTENT WITH COMBUSTION ENGINEERING FOR A WET LIMESTONE SCRUBBING SYSTEM TO CONTROL EMISSIONS. OPERATIONS ARE SCHEDULED TO COMMENCE IN 1986.
MIDDLE SOUTH UTILITIES ARKANSAS LIGNITE 6 NEW 890.0 MW (GROSS) 890.0 MW (ESC) COAL .50 %S LIGNITE PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 4 STARTUP 1/88	UNIT 2 OF THE ARKANSAS ENERGY LIGNITE CENTER IS A LIGNITE (.5% S) FIRED BOILER. MIDDLE SOUTH UTILITIES HAS SIGNED A LETTER OF INTENT WITH COMBUSTION ENGINEERING FOR A WET LIMESTONE SCRUBBING SYSTEM TO CONTROL EMISSIONS. OPERATIONS ARE SCHEDULED TO COMMENCE IN 1988.
MIDDLE SOUTH UTILITIES UNASSIGNED 1 NEW 890.0 MW (GROSS) 890.0 MW (ESC) COAL .50 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 4 STARTUP 0/85	MIDDLE SOUTH UTILITIES HAS SIGNED A LETTER OF INTENT WITH COMBUSTION ENGINEERING FOR A WET LIMESTONE SCRUBBING SYSTEM TO CONTROL EMISSIONS. THE PLANT NAME AND LOCATION ARE NOT YET ASSIGNED. THE EXACT START UP DATE HAS NOT BEEN DETERMINED.
MIDDLE SOUTH UTILITIES UNASSIGNED 2 NEW 890.0 MW (GROSS) 890.0 MW (ESC) COAL .50 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 4 STARTUP 0/87	MIDDLE SOUTH UTILITIES HAS SIGNED A LETTER OF INTENT WITH COMBUSTION ENGINEERING FOR A WET LIMESTONE SCRUBBING SYSTEM TO CONTROL EMISSIONS. THE PLANT NAME AND LOCATION HAVE NOT YET BEEN ASSIGNED. THE EXACT START UP DATE HAS NOT BEEN DETERMINED.

UNIT IDENTIFICATION	ABSTRACT
MIDDLE SOUTH UTILITIES WILTON 1 NEW 890.0 MW (GROSS) 890.0 MW (ESC) COAL .50 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 4 STARTUP 0/86	WILTON 1 IS A COAL (.48% S) FIRED BOILER TO BE LOCATED IN LOUISIANA. MIDDLE SOUTH UTILITIES HAS SIGNED A LETTER OF INTENT WITH COMBUSTION ENGINEERING FOR A WET LIMESTONE SCRUBBING SYSTEM FOR EMISSION CONTROL. START UP IS SCHEDULED FOR 1986.
MIDDLE SOUTH UTILITIES WILTON 2 NEW 890.0 MW (GROSS) 890.0 MW (ESC) COAL .50 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 4 STARTUP 0/88	WILTON 2 IS A COAL (.48% S) FIRED BOILER TO BE LOCATED IN LOUISIANA. MIDDLE SOUTH UTILITIES HAS SIGNED A LETTER OF INTENT WITH COMBUSTION ENGINEERING FOR A WET LIMESTONE SCRUBBING SYSTEM FOR EMISSION CONTROL. OPERATIONS ARE SCHEDULED TO COMMENCE IN 1988.
MINNESOTA POWER & LIGHT CLAY BOSWELL 4 NEW 554.0 MW (GROSS) 475.0 MW (ESC) COAL .94 %S SUBBITUMINOUS LIME/ALKALINE FLYASH PEABODY PROCESS SYSTEMS ENERGY CONSUMPTION: 1.3% STATUS 1 STARTUP 4/80	CLAY BOSWELL 4 OF MINNESOTA POWER AND LIGHT IS A SUBBITUMINOUS COAL (0.94% S, 8896 BTU/LB) FIRED UNIT LOCATED IN COHASSET, MINNESOTA. PEABODY PROCESS SYSTEMS HAS SUPPLIED A LIME/ALKALINE FLYASH SYSTEM WHICH IS DESIGNED TO REMOVE 89% OF THE SO2 IN THE FLUE GAS. TWO HOT SIDE ESP'S ARE FOLLOWED BY VENTURI/SPRAY TOWER TRAINS. MIST ELIMINATION IS PROVIDED BY A SIEVE TRAY FOLLOWED BY A SPIN VANE CHEVRON, AND REHEAT IS SUPPLIED BY BYPASSING 5% OF THE FLUE GAS. THE SYSTEM OPERATES IN A CLOSED WATER LOOP MODE, AND THE SLUDGE IS DISPOSED IN A LINED POND. OPERATIONS COMMENCED IN APRIL, 1980.
MINNKOTA POWER COOPERATIVE MILTON R. YOUNG 2 NEW 440.0 MW (GROSS) 185.0 MW (ESC) COAL .70 %S LIGNITE LIME/ALKALINE FLYASH ADL/COMBUSTION EQUIP ASSOCIATE ENERGY CONSUMPTION: 1.6% STATUS 1 STARTUP 9/77	MINNKOTA POWER COOPERATIVE'S MILTON R. YOUNG 2 IS A CYCLONE FIRED LIGNITE (0.70%S, 6500 BTU/LB) BOILER LOCATED IN CENTER, NORTH DAKOTA. THE BOILER PRODUCES 2,021,400 ACFM OF FLUE GAS, WHICH IS CLEANED BY TWO ESP'S AND TWO ADL/COMBUSTION EQUIPMENT ASSOCIATES LIME/ALKALINE FLYASH SPRAY TOWERS (75% DESIGN SO2 REMOVAL EFFICIENCY). THE CLEANED GAS PASSES THROUGH A CHEVRON MIST ELIMINATOR BEFORE IT JOINS A 15% BYPASS REHEAT AND EXITS A 550 FOOT STACK. THE WATER LOOP IS OPEN, AND THE SLUDGE IS TRUCKED TO AN OFF-SITE MINEFILL. THIS SYSTEM HAS BEEN OPERATIONAL SINCE SEPTEMBER, 1977.
MONONGAHELA POWER PLEASANTS 1 NEW 618.0 MW (GROSS) 618.0 MW (ESC) COAL 3.70 %S BITUMINOUS LIME BABCOCK & WILCOX ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 3/79	ALLEGHENY POWER SYSTEM'S PLEASANTS 1 IS A BITUMINOUS COAL (3.70% S, 12,150 BTU/LB) FIRED BOILER IN BELMONT, WEST VIRGINIA. BABCOCK AND WILCOX SUP- PLIED A LIME FGD SYSTEM DESIGNED TO REMOVE 90% OF THE FLUE GAS SO2 FROM THIS UNIT. THE EMISSION CONTROL SYSTEM INCLUDES AN ESP UPSTREAM OF FOUR SPRAY TOWER ABSORBERS. A FLUE GAS BYPASS SYSTEM PROVIDES REHEAT OF THE CLEANED GAS BEFORE IT IS DISCHARGED THROUGH A 1200 FOOT PLACITE LINED STACK. THE SYSTEM OPERATES IN AN OPEN WATER LOOP. THE FGD SYSTEM ON THIS UNIT HAS BEEN OPERATIONAL SINCE MARCH OF 1979.
MONONGAHELA POWER PLEASANTS 2 NEW 618.0 MW (GROSS) 618.0 MW (ESC) COAL 4.50 %S BITUMINOUS LIME BABCOCK & WILCOX ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 9/80	ALLEGHENY POWER SYSTEM'S PLEASANTS 2 IS A BITUMINOUS COAL (4.5% S, 12,150 BTU/LB) FIRED BOILER UNDER CONSTRUCTION IN BELMONT, WEST VIRGINIA. BABCOCK AND WILCOX IS SUPPLYING A LIME FGD SYSTEM DESIGNED TO REMOVE 90% OF THE BOILER FLUE GAS SO2. THE EMISSION CONTROL SYSTEM ON THIS UNIT WILL INCLUDE AN ESP UPSTREAM OF FOUR SPRAY TOWER ABSORBERS. A FLUE GAS BYPASS SYSTEM WILL PROVIDE REHEAT OF THE CLEANED GAS BEFORE IT IS DISCHARGED THROUGH A 1200 FOOT PLACITE LINED STACK. THE SYSTEM WILL OPERATE IN AN OPEN WATER LOOP. FGD SYSTEM START UP IS EXPECTED IN SEPTEMBER, 1980.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
MONTANA POWER COLSTRIP 1 NEW 360.0 MW (GROSS) 360.0 MW (ESC) COAL .77 %S SUBBITUMINOUS LIME/ALKALINE FLYASH ADL/COMBUSTION EQUIP ASSOCIATE ENERGY CONSUMPTION: 3.3% STATUS 1 STARTUP 9/75	COLSTRIP 1 OF MONTANA POWER IS A SUBBITUMINOUS COAL (0.77% S, 8843 BTU/LB) FIRED UNIT LOCATED IN COLSTRIP, MONTANA. ADL/COMBUSTION EQUIPMENT ASSOCIATES SUPPLIED A LIME.ALKALINE FLYASH FGD SYSTEM CONSISTING OF THREE VENTURI SCRUBBER/SPRAY TOWER ABSORBER TRAINS. THE ABSORBERS ARE FOLLOWED BY HORIZONTAL CHEVRON MIST ELIMINATORS, A STEAM TUBE REHEATER, AND A 500 FOOT STACK. THE UNSTABILIZED SLUDGE IS DISPOSED IN AN ON-SITE LINED POND. THE WATER LOOP IS CLOSED. OPERATIONS INITIALLY BEGAN IN SEPTEMBER OF 1975.
MONTANA POWER COLSTRIP 2 NEW 360.0 MW (GROSS) 360.0 MW (ESC) COAL .77 %S SUBBITUMINOUS LIME/ALKALINE FLYASH ADL/COMBUSTION EQUIP ASSOCIATE ENERGY CONSUMPTION: 3.3% STATUS 1 STARTUP 5/76	COLSTRIP 2 OF MONTANA POWER IS A SUBBITUMINOUS COAL (0.77% S, 8843 BTU/LB) FIRED UNIT LOCATED IN COLSTRIP, MONTANA. ADL/COMBUSTION EQUIPMENT ASSOCIATES SUPPLIED A LIME/ALKALINE FLYASH FGD SYSTEM CONSISTING OF THREE VENTURI SCRUBBER/SPRAY TOWER ABSORBER TRAINS. THE ABSORBERS ARE FOLLOWED BY HORIZONTAL CHEVRON MIST ELIMINATORS, A STEAM TUBE REHEATER, AND A 500 FOOT STACK. THE UNSTABILIZED SLUDGE IS DISPOSED IN AN ON-SITE LINED POND. THE WATER LOOP IS CLOSED. OPERATIONS INITIALLY BEGAN IN MAY OF 1976.
MONTANA POWER COLSTRIP 3 NEW 700.0 MW (GROSS) 700.0 MW (ESC) COAL .70 %S LIME/ALKALINE FLYASH ADL/COMBUSTION EQUIP ASSOCIATE ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 0/83	MONTANA POWER'S COLSTRIP 3 IS A LOW SULFUR COAL (0.7% S, 8800 BTU/LB) FIRED UNIT UNDER CONSTRUCTION IN COLSTRIP, MONTANA. A CONTRACT HAS BEEN AWARDED TO ADL/COMBUSTION EQUIPMENT ASSOCIATES FOR A LIME/ALKALINE FLYASH FGD SYSTEM ON THIS UNIT. START UP IS SCHEDULED FOR 1983.
MONTANA POWER COLSTRIP 4 NEW 700.0 MW (GROSS) 700.0 MW (ESC) COAL .70 %S LIME/ALKALINE FLYASH ADL/COMBUSTION EQUIP ASSOCIATE ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 0/84	MONTANA POWER'S COLSTRIP 4 IS A LOW SULFUR COAL (0.7% S, 8800 BTU/LB) FIRED UNIT UNDER CONSTRUCTION IN COLSTRIP, MONTANA. A CONTRACT HAS BEEN AWARDED TO ADL/COMBUSTION EQUIPMENT ASSOCIATES FOR A LIME/ALKALINE FLYASH FGD SYSTEM ON THIS UNIT. START UP IS SCHEDULED FOR 1984.
MONTANA-DAKOTA UTILITIES COYOTE 1 NEW 440.0 MW (GROSS) 440.0 MW (ESC) COAL .87 %S LIGNITE AQUEOUS CARBONATE/SPRAY DRYING WHEELABRATOR-FRYE/R.I. ENERGY CONSUMPTION: 1.1% STATUS 2 STARTUP 3/81	COYOTE 1 IS A CYCLONE FIRED PULVERIZED LIGNITE (0.875% S, 7050 BTU/LB) BOILER UNDER CONSTRUCTION IN BEULAH, NORTH DAKOTA. THIS UNIT IS JOINTLY OWNED BY FIVE UTILITIES, WITH MONTANA-DAKOTA UTILITIES BEING THE MAJOR OWNER AND CONSTRUCTOR. AN AQUEOUS CARBONATE DRY FGD SYSTEM DESIGNED TO REMOVE 70% OF THE SO2 IS BEING SUPPLIED BY WHEELABRATOR-FRYE AND ATOMICS INTERNATIONAL. THE SPRAY DRYER/BAGHOUSE SYSTEM IS SCHEDULED TO START UP IN 1981.
MUSCATINE POWER & WATER MUSCATINE 9 NEW 166.0 MW (GROSS) 166.0 MW (ESC) COAL 3.00 %S BITUMINOUS LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 4.8% STATUS 3 STARTUP 9/82	MUSCATINE 9 IS A PULVERIZED BITUMINOUS COAL (3% S, 11,200 BTU/LB) FIRED UNIT PLANNED BY MUSCATINE POWER AND WATER TO BE LOCATED IN MUSCATINE, IOWA. A CONTRACT WAS AWARDED TO RESEARCH COTTRELL FOR A LIMESTONE UNIT FOR EMISSION CONTROL. THE FGD SYSTEM WILL FEATURE AN ESP, TWO 100% CAPACITY TOWERS, STEAM COIL REHEAT, A CLOSED WATER LOOP, AND FORCED OXIDATION OF THE SLUDGE BEFORE LANDFILL. THE DESIGN SO2 REMOVAL WILL BE 94%. START UP WILL TAKE PLACE IN 1982.

UNIT IDENTIFICATION	ABSTRACT
NEBRASKA PUBLIC POWER DISTRICT FOSSIL III 1 NEW 650.0 MW (GROSS) 650.0 MW (ESC) COAL .36 %S SUBBITUMINOUS PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 3/87	FOSSIL III 1 IS A PULVERIZED SUBBITUMINOUS COAL (0.36% S, 8500 BTU/LB) FIRED UNIT PLANNED BY THE NEBRASKA PUBLIC POWER DISTRICT TO BE LOCATED NEAR SARGENT, NEBRASKA. THE UTILITY IS CONSIDERING A DRY SCRUBBING FGD PROCESS TO CONTROL EMISSIONS FROM THE 650 MW BOILER. STARTUP FOR THE UNIT IS SCHEDULED FOR 1987.
NEVADA POWER HARRY ALLEN 1 NEW 500.0 MW (GROSS) 500.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 6/86	NEVADA POWER'S HARRY ALLEN 1 IS A PLANNED COAL FIRED UNIT TO BE LOCATED IN LAS VEGAS, NEVADA. THE UTILITY IS CONSIDERING A HOT SIDE ESP IN CONJUNCTION WITH AN FGD SYSTEM. SPECIFICATIONS HAVE NOT YET BEEN PREPARED. START UP IS SCHEDULED FOR JUNE, 1986.
NEVADA POWER HARRY ALLEN 2 NEW 500.0 MW (GROSS) 500.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 6/87	NEVADA POWER'S HARRY ALLEN 2 IS A PLANNED COAL FIRED UNIT TO BE LOCATED IN LAS VEGAS, NEVADA. THE UTILITY IS CONSIDERING A HOT SIDE ESP IN CONJUNCTION WITH AN FGD SYSTEM. SPECIFICATIONS HAVE NOT YET BEEN PREPARED. START UP IS SCHEDULED FOR JUNE, 1987.
NEVADA POWER HARRY ALLEN 3 NEW 500.0 MW (GROSS) 500.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 6/88	NEVADA POWER'S HARRY ALLEN 3 IS A PLANNED COAL FIRED UNIT TO BE LOCATED IN LAS VEGAS, NEVADA. THE UTILITY IS CONSIDERING A HOT SIDE ESP IN CONJUNCTION WITH AN FGD SYSTEM. SPECIFICATIONS HAVE NOT YET BEEN PREPARED. START UP IS SCHEDULED FOR JUNE, 1988.
NEVADA POWER HARRY ALLEN 4 NEW 500.0 MW (GROSS) 500.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 6/89	NEVADA POWER'S HARRY ALLEN 4 IS A PLANNED COAL FIRED UNIT TO BE LOCATED IN LAS VEGAS, NEVADA. THE UTILITY IS CONSIDERING A HOT SIDE ESP IN CONJUNCTION WITH AN FGD SYSTEM. SPECIFICATIONS HAVE NOT YET BEEN PREPARED. START UP IS SCHEDULED FOR JUNE, 1989.
NEVADA POWER REID GARDNER 1 RETROFIT 125.0 MW (GROSS) 125.0 MW (ESC) COAL .50 %S BITUMINOUS SODIUM CARBONATE ADL/COMBUSTION EQUIP ASSOCIATE ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 4/74	REID GARDNER 1 IS A WET BOTTOM LOW SULFUR COAL (0.5% S, 12,450 BTU/LB) FIRED UNIT OWNED BY NEVADA POWER, LOCATED IN MOAPA, NEVADA. A SODIUM CARBONATE-BASED (TRONA) SCRUBBING SYSTEM BY ADL/COMBUSTION EQUIPMENT ASSOCIATES CONSISTS OF ONE MODULE CONTAINING TWIN VARIABLE THROAT VENTURIS FOLLOWED BY A SEPARATOR IN SERIES WITH A SINGLE STAGE PEFORATED PLATE WASH TOWER. PRIMARY PARTICULATE CONTROL IS PROVIDED BY UPSTREAM MULTICLONES. A RADIAL VANE MIST ELIMINATOR PRECEDES AN INDIRECT STEAM HOT AIR REHEATER AND A 200 FOOT STACK. THE SYSTEM OPERATES IN AN OPEN WATER LOOP, AND THE SLUDGE IS DISPOSED IN AN ON-SITE CLAY LINED SOLAR EVAPORATION POND. THE DESIGN SO2 REMOVAL EFFICIENCY IS 90%. THE SYSTEM HAS BEEN OPERATIONAL SINCE APRIL, 1974.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
NEVADA POWER REID GARDNER 2 RETROFIT 125.0 MW (GROSS) 125.0 MW (ESC) COAL .50 %S BITUMINOUS SODIUM CARBONATE ADL/COMBUSTION EQUIP ASSOCIATE ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 4/74	REID GARDNER 2 IS A WET BOTTOM LOW SULFUR COAL (0.5% S, 12,450 BTU/LB) FIRED UNIT OWNED BY NEVADA POWER, LOCATED IN MOAPA, NEVADA. A SODIUM CARBONATE-BASED (TRONA) SCRUBBING SYSTEM BY ADL/COMBUSTION EQUIPMENT ASSOCIATES CONSISTS OF ONE MODULE CONTAINING TWIN VARIABLE THROAT VENTURIS FOLLOWED BY A SEPARATOR IN SERIES WITH A SINGLE STAGE PEFORATED PLATE WASH TOWER. PRIMARY PARTICULATE CONTROL IS PROVIDED BY UPSTREAM MULTICLONES. A RADIAL VANE MIST ELIMINATOR PRECEDES AN INDIRECT STEAM HOT AIR REHEATER AND A 200 FOOT STACK. THE SYSTEM OPERATES IN AN OPEN WATER LOOP, AND THE SLUDGE IS DISPOSED IN AN ON-SITE CLAY LINED SOLAR EVAPORATION POND. THE DESIGN SO2 REMOVAL EFFICIENCY IS 90%. THE SYSTEM HAS BEEN OPERATIONAL SINCE APRIL, 1974.
NEVADA POWER REID GARDNER 3 NEW 125.0 MW (GROSS) 125.0 MW (ESC) COAL .50 %S BITUMINOUS SODIUM CARBONATE ADL/COMBUSTION EQUIP ASSOCIATE ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 6/76	REID GARDNER 3 IS A WET BOTTOM LOW SULFUR COAL (0.5% S, 12,450 BTU/LB) FIRED UNIT OWNED BY NEVADA POWER, LOCATED IN MOAPA, NEVADA. A SODIUM CARBONATE-BASED (TRONA) SCRUBBING SYSTEM BY ADL/COMBUSTION EQUIPMENT ASSOCIATES CONSISTS OF ONE MODULE CONTAINING TWIN VARIABLE THROAT VENTURIS FOLLOWED BY A SEPARATOR IN SERIES WITH A SINGLE STAGE PEFORATED PLATE WASH TOWER. PRIMARY PARTICULATE CONTROL IS PROVIDED BY UPSTREAM MULTICLONES. A RADIAL VANE MIST ELIMINATOR PRECEDES AN INDIRECT STEAM HOT AIR REHEATER AND A 200 FOOT STACK. THE SYSTEM OPERATES IN AN OPEN WATER LOOP, AND THE SLUDGE IS DISPOSED IN AN ON-SITE CLAY LINED SOLAR EVAPORATION POND. THE DESIGN SO2 REMOVAL EFFICIENCY IS 90%. THE SYSTEM HAS BEEN OPERATIONAL SINCE JUNE, 1976.
NEVADA POWER REID GARDNER 4 NEW 250.0 MW (GROSS) 250.0 MW (ESC) COAL .75 %S SODIUM CARBONATE COMBUSTION EQUIPMENT ASSOCIATE ENERGY CONSUMPTION: ****% STATUS 4 STARTUP 4/83	REID GARDNER 4 OF NEVADA POWER IS A COAL (0.75% S, 12,450 BTU/LB) FIRED UNIT PLANNED FOR LOCATION IN MOAPA, NEVADA. A LETTER OF INTENT HAS BEEN SIGNED WITH COMBUSTION EQUIPMENT ASSOCIATES TO PROVIDE A SODIUM CARBONATE FGD SYSTEM. A BAGHOUSE WILL PRECEED THE FGD SYSTEM FOR PARTICLE CONTROL. CONSTRUCTION IS EXPECTED TO BEGIN IN 1980, AND START UP IS EXPECTED IN 1983.
NEVADA POWER WARNER VALLEY 1 NEW 295.0 MW (GROSS) 295.0 MW (ESC) COAL 1.15 %S SUBBITUMINOUS PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 6/85	NEVADA POWER'S WARNER VALLEY 1 IS A PLANNED COAL (1.15% S) FIRED UNIT TO BE LOCATED IN ST. GEORGE, UTAH. THE UTILITY IS CURRENTLY EVALUATING BIDS FOR AN FGD SYSTEM. NO ANNOUNCEMENTS HAVE YET BEEN MADE CONCERNING THE EMISSION CONTROL STRATEGY FOR THIS UNIT. START UP IS EXPECTED IN JUNE OF 1985.
NEVADA POWER WARNER VALLEY 2 NEW 295.0 MW (GROSS) 295.0 MW (ESC) COAL 1.15 %S SUBBITUMINOUS PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 6/86	NEVADA POWER'S WARNER VALLEY 2 IS A PLANNED COAL (1.15% S) FIRED UNIT TO TO BE LOCATED IN ST. GEORGE, UTAH. THE UTILITY IS CURRENTLY EVALUATING FOR AN FGD SYSTEM. NO ANNOUNCEMENTS HAVE YET BEEN MADE CONCERNING THE EMISSION CONTROL STRATEGY FOR THIS UNIT. START UP IS EXPECTED IN JUNE OF 1986.
NEW YORK STATE ELEC & GAS SOMERSET 1 NEW 870.0 MW (GROSS) 870.0 MW (ESC) COAL 2.20 %S BITUMINOUS LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 6/84	THE SOMERSET 1 UNIT OF THE NEW YORK STATE ELECTRIC & GAS CORP. IS A PULVERIZED COAL BOILER LOCATED IN SOMERSET, NEW YORK. THE BOILER GENERATES A FLUE GAS FLOW OF 3,100,000 ACFM AND FIRES A BITUMINOUS COAL WITH AN AVERAGE SULFUR CONTENT OF 2.2% AND AN AVERAGE HEAT CONTENT OF 12,400 BTU/LB. A COLD SIDE ESP WITH A DESIGN EFFICIENCY OF 99.77% WILL PROVIDE THE PRIMARY PARTICULATE REMOVAL. A LIMESTONE ABSORBER WITH A DESIGN REMOVAL EFFICIENCY OF 90% WILL BE USED FOR SO2 REMOVAL. THE SYSTEM WILL OPERATE IN A CLOSED LOOP MODE. THE SLUDGE IS TO BE DEWATERED AND STABILIZED BEFORE BEING LANDFILLED.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
NIAGARA MOHAWK POWER COOP CHARLES R. HUNTLEY 66 RETROFIT 100.0 MW (GROSS) 100.0 MW (ESC) COAL 1.80 %S AQUEOUS CARBONATE/SPRAY DRYING ROCKWELL INTERNATIONAL ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 4/82	CHARLES R. HUNTLEY 66 OF NIAGARA POWER COOP IS A PULVERIZED COAL (1.8% S, 12,500 BTU/LB) FIRED UNIT LOCATED IN BUFFALO, NEW YORK. A CONTRACT WAS AWARDED TO ATOMICS INTERNATIONAL FOR THE DESIGN AND INSTALLATION OF A 90% EFFICIENT RETROFIT AQUEOUS CARBONATE FGD SYSTEM WHICH WILL PRODUCE ELEMENTAL SULFUR AS AN END PRODUCT. FUNDS ARE BEING PROVIDED BY THE U.S.EPA AND THE EMPIRE STATE ELECTRIC ENERGY RESEARCH CORP. A SPRAY DRYER WILL BE FOLLOWED BY TWO BANKS OF EIGHT CYCLONES AN ESP, AND A 200 FOOT STEEL LINED STACK. THE WATER LOOP WILL BE OPEN. START UP OF THE FGD SYSTEM WILL BE IN 1982.
NORTHERN INDIANA PUB SERVICE DEAN H. MITCHELL 11 RETROFIT 115.0 MW (GROSS) 115.0 MW (ESC) COAL 3.50 %S WELLMAN LORD DAVY MCKEE ENERGY CONSUMPTION: 27.8% STATUS 1 STARTUP 7/76	NORTHERN INDIANA PUBLIC SERVICE'S DEAN H. MITCHELL 11 IS A COAL (3.5% S, 11,000 BTU/LB) FIRED UNIT LOCATED IN GARY, INDIANA. A RETROFIT WELLMAN LORD FGD SYSTEM BY DAVY POWERGAS HAS BEEN OPERATING ON THIS UNIT SINCE JULY, 1976. AN ESP IS FOLLOWED BY A VARIABLE THROAT VENTURI SCRUBBER AND A TRAY TOWER ABSORBER (90% DESIGN SO2 REMOVAL EFFICIENCY). A DIRECT COMBUSTION RAISES THE CLEANED GAS TEMPERATURE 50 DEG F BEFORE THE GAS IS DISCHARGED THROUGH A 168 FOOT STAINLESS STEEL AND FRP LINED STACK. ELEMENTAL SULFUR AND SULFATE IS PRODUCED BY THE PROCESS DEVELOPED BY ALLIED CHEMICAL. THE SYSTEM OPERATES IN A CLOSED WATER LOOP MODE.
NORTHERN INDIANA PUB SERVICE SCHAHFER 17 NEW 421.0 MW (GROSS) 421.0 MW (ESC) COAL 3.20 %S BITUMINOUS DUAL ALKALI FMC ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 6/83	SCHAHFER 17 OF NORTHERN INDIANA PUBLIC SERVICE IS A 3.2% SULFUR COAL FIRED UNIT PLANNED FOR CONSTRUCTION IN WHEATFIELD, INDIANA. THE UTILITY HAS AWARDED A CONTRACT TO FMC FOR THE INSTALLATION OF A DUAL ALKALI FGD SYSTEM AT THIS UNIT. PARTICULATE MATTER WILL BE COLLECTED BY AN ESP AND THE SYSTEM WILL INCLUDE A REHEATER. START UP OF THIS UNIT IS SCHEDULED FOR JUNE OF 1983.
NORTHERN INDIANA PUB SERVICE SCHAHFER 18 NEW 421.0 MW (GROSS) 421.0 MW (ESC) COAL 3.20 %S BITUMINOUS DUAL ALKALI FMC ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 6/85	SCHAHFER 18 OF NORTHERN INDIANA PUBLIC SERVICE IS A 3.2% SULFUR COAL FIRED UNIT PLANNED FOR CONSTRUCTION IN WHEATFIELD, INDIANA. THE UTILITY HAS AWARDED A CONTRACT TO FMC FOR THE INSTALLATION OF A DUAL ALKALI FGD SYSTEM AT THIS UNIT. PARTICULATE MATTER WILL BE COLLECTED BY AN ESP AND THE SYSTEM WILL INCLUDE A REHEATER. START UP OF THIS UNIT IS SCHEDULED FOR JUNE OF 1985.
NORTHERN STATES POWER RIVERSIDE 6,7 RETROFIT 110.0 MW (GROSS) 110.0 MW (ESC) COAL 1.20 %S SUBBITUMINOUS LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 8/80	RIVERSIDE 6 AND 7 ARE TWO COAL FIRED BOILERS OWNED BY NORTHERN STATES POWER AND LOCATED IN MINNEAPOLIS, MINNESOTA. EACH BOILER GENERATES A FLUE GAS FLOW OF 340,000 ACFM AT 350 F. CURRENTLY, A DEMONSTRATION LIME/SPRAY DRYING FGD SYSTEM IS UNDER CONSTRUCTION THAT WILL BE CAPABLE OF TREATING THE FLUE GAS FROM BOTH BOILERS. THE SYSTEM IS BEING SUPPLIED BY NIRO ATOMIZER/JOY MANUFACTURING AND WILL CONSIST OF A SPRAY DRYER FOLLOWED BY A BAGHOUSE. THE CLEAN FLUE GAS WILL BE VENTED TO TWO 275 FT CONCRETE STACKS WITH FIRE BRICK LINERS. SPENT ABSORBENT WILL BE DISPOSED OF IN ON AND OFF SITE LANDFILLS. OPERATIONS ARE EXPECTED TO BEGIN IN AUGUST, 1980.
NORTHERN STATES POWER SHERBURNE 1 NEW 740.0 MW (GROSS) 740.0 MW (ESC) COAL .80 %S SUBBITUMINOUS LIMESTONE/ALKALINE FLYASH COMBUSTION ENGINEERING ENERGY CONSUMPTION: 2.7% STATUS 1 STARTUP 3/76	NORTHERN STATES POWER'S SHERBURNE 1 IS A BALANCED DRAFT PULVERIZED SUBBITUMINOUS COAL (0.80% S, 8500 BTU/LB) FIRED BOILER IN BECKER, MINNESOTA. A 50% EFFICIENT (DESIGN) LIMESTONE/ALKALINE FLYASH FGD SYSTEM SUPPLIED BY COMBUSTION ENGINEERING HAS BEEN OPERATIONAL ON THIS UNIT SINCE MARCH OF 1976. TWELVE VARIABLE THROAT ROD DECK VENTURI/MARBLE BED ABSORBER TRAINS ARE FOLLOWED BY ONE CHEVRON MIST ELIMINATORS/TRAIN, AN IN-LINE HOT WATER REHEATER, AND A 650 FOOT CORTEN LINED STACK. THE SLUDGE IS FORCIBLY OXIDIZED AND DISPOSED IN A CLAY LINED SETTLING POND. THE WATER LOOP IS OPEN.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
NORTHERN STATES POWER SHERBURNE 2 NEW 740.0 MW (GROSS) 740.0 MW (ESC) COAL .80 %S SUBBITUMINOUS LIMESTONE/ALKALINE FLYASH COMBUSTION ENGINEERING ENERGY CONSUMPTION: 2.7% STATUS 1 STARTUP 4/77	NORTHERN STATES POWER'S SHERBURNE 2 IS A BALANCED DRAFT PULVERIZED SUBBITUMINOUS COAL (0.80% S, 8500 BTU/LB) FIRED BOILER IN BECKER, MINNESOTA. A 50% EFFICIENT (DESIGN) LIMESTONE/ALKALINE FLYASH FGD SYSTEM SUPPLIED BY COMBUSTION ENGINEERING HAS BEEN OPERATIONAL ON THIS UNIT SINCE APRIL OF 1977. TWELVE VARIABLE THROAT ROD DECK VENTURI/MARBLE BED ABSORBER TRAINS ARE FOLLOWED BY ONE CHEVRON MIST ELIMINATORS/TRAIN, AN IN-LINE HOT WATER REHEATER, AND A 650 FOOT CORTEN LINED STACK. THE SLUDGE IS FORCIBLY OXIDIZED AND DISPOSED IN A CLAY LINED SETTLING POND. THE WATER LOOP IS OPEN.
NORTHERN STATES POWER SHERBURNE 3 NEW 860.0 MW (GROSS) 860.0 MW (ESC) COAL .80 %S LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 5/85	NORTHERN STATES POWER'S SHERBURNE 3 IS A PLANNED TANGENTIAL FIRED PULVERIZED SUBBITUMINOUS COAL (0.80% S, 8500 BTU/LB) FIRED UNIT TO BE CONSTRUCTED IN BECKER, MINNESOTA. DUE TO THE LATEST TECHNOLOGY THAT HAS BEEN DEVELOPED BIDS HAVE AGAIN BEEN OPENED. THE UTILITY IS PRESENTLY EVALUATING THREE DIFFERENT TYPES OF FGD SYSTEMS. MAY, 1985 IS EXPECTED START UP.
PACIFIC GAS & ELECTRIC MONTEZUMA 1 NEW 800.0 MW (GROSS) 800.0 MW (ESC) COAL .80 %S SUBBITUMINOUS LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: 3.5% STATUS 6 STARTUP 6/89	MONTEZUMA 1 OF PACIFIC GAS AND ELECTRIC IS A COAL (0.8% S, 12,000 BTU/LB) FIRED BOILER PLANNED FOR COLLINSVILLE, CALIFORNIA. THE EMISSION CONTROL SYSTEM WILL CONSIST OF A BAGHOUSE AND A LIMESTONE FGD SYSTEM. SLUDGE WILL BE DISPOSED OF IN A LANDFILL. START UP DATE IS JUNE, 1989.
PACIFIC GAS & ELECTRIC MONTEZUMA 2 NEW 800.0 MW (GROSS) 800.0 MW (ESC) COAL .80 %S SUBBITUMINOUS LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: 3.5% STATUS 6 STARTUP 6/90	MONTEZUMA 2 OF PACIFIC GAS AND ELECTRIC IS A COAL (0.8% S, 12,000 BTU/LB) FIRED BOILER PLANNED FOR COLLINSVILLE, CALIFORNIA. THE EMISSION CONTROL SYSTEM WILL CONSIST OF A BAGHOUSE AND A LIMESTONE FGD SYSTEM. SLUDGE WILL BE DISPOSED OF IN A LANDFILL. START UP DATE IS JUNE, 1990.
PACIFIC POWER & LIGHT JIM BRIDGER 4 NEW 550.0 MW (GROSS) 550.0 MW (ESC) COAL .56 %S SUBBITUMINOUS SODIUM CARBONATE AIR CORRECTION DIVISION, UOP ENERGY CONSUMPTION: .2% STATUS 1 STARTUP 9/79	PACIFIC POWER AND LIGHT'S JIM BRIDGER 4 IS A DRY BOTTOM PULVERIZED SUBBITUMINOUS COAL (0.56% S, 9300 BTU/LB) FIRED BOILER LOCATED IN ROCK SPRINGS, WYOMING. A 91% EFFICIENT SODIUM CARBONATE FGD SYSTEM FOR THIS UNIT WAS SUPPLIED BY THE AIR CORRECTION DIVISION OF UOP. A COLD SIDE ESP TREATS 2,720,000 ACFM OF FLUE GAS, FOLLOWED BY THREE SIEVE TRAY ABSORBERS. THE SYSTEM OPERATES IN A CLOSED WATER LOOP MODE. A SYSTEM CHECK OUT WAS CONDUCTED IN JULY OF 1979, AND OPERATIONS BEGAN IN SEPTEMBER, 1979.
PENNSYLVANIA POWER BRUCE MANSFIELD 1 NEW 917.0 MW (GROSS) 917.0 MW (ESC) COAL 3.00 %S BITUMINOUS LIME CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: 6.0% STATUS 1 STARTUP 12/75	BRUCE MANSFIELD 1 OF PENNSYLVANIA POWER IS A SUPERCRITICAL, BALANCED DRAFT BOILER FIRING PULVERIZED COAL (3.0% S, 11,500 BTU/LB) IN SHIPPINGPORT, PENNSYLVANIA. A CHEMICO THIOSORBIC LIME FGD SYSTEM WAS DESIGNED TO REMOVE FLYASH AND SO2 (92.1%) FROM 3,350,000 ACFM OF FLUE GAS. THE FGD SYSTEM CONSISTS OF SIX VARIABLE THROAT VENTURI SCRUBBERS FOLLOWED BY SIX FIXED THROAT VENTURI ABSORBERS, HORIZONTAL MIST ELIMINATORS, TWO DIRECT COMBUSTION REHEATERS, AND A 950 FOOT FLAKEGLASS STACK SHARED BY UNITS 1 AND 2. THE WATER LOOP IS OPEN, AND THE CALCILOX STABILIZED SLUDGE IS DISPOSED IN AN OFF SITE LANDFILL. THIS SYSTEM HAS BEEN OPERATIONAL SINCE DECEMBER, 1975.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
PENNSYLVANIA POWER BRUCE MANSFIELD 2 NEW 917.0 MW (GROSS) 917.0 MW (ESC) COAL 3.00 %S BITUMINOUS LIME CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: 6.0% STATUS 1 STARTUP 7/77	BRUCE MANSFIELD 2 OF PENNSYLVANIA POWER IS A SUPERCRITICAL, BALANCED DRAFT BOILER FIRING PULVERIZED COAL (3.0% S, 11,500 BTU/LB) IN SHIPPINGPORT, PENNSYLVANIA. A CHEMICO THIOSORBIC LIME FGD SYSTEM WAS DESIGNED TO REMOVE FLYASH AND SO2 (92.1%) FROM 3,350,000 ACFM OF FLUE GAS. THE FGD SYSTEM CONSISTS OF SIX VARIABLE THROAT VENTURI SCRUBBERS FOLLOWED BY SIX FIXED THROAT VENTURI ABSORBERS, HORIZONTAL MIST ELIMINATORS, TWO DIRECT COMBUSTION REHEATERS, AND A 950 FOOT FLAKEGLASS STACK SHARED BY UNITS 1 AND 2. THE WATER LOOP IS OPEN, AND THE CALCILOX STABILIZED SLUDGE IS DISPOSED IN AN OFF SITE LANDFILL. THIS SYSTEM HAS BEEN OPERATIONAL SINCE JULY, 1977.
PENNSYLVANIA POWER BRUCE MANSFIELD 3 NEW 917.0 MW (GROSS) 917.0 MW (ESC) COAL 3.00 %S LIME PULLMAN KELLOGG ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 10/80	BRUCE MANSFIELD 3 OF PENNSYLVANIA POWER IS A SUPERCRITICAL PULVERIZED COAL (3.0% S, 11,500 BTU/LB) FIRED BOILER LOCATED IN SHIPPINGPORT, PENNSYLVANIA. FOUR ESP'S TREAT 3,308,000 ACFM OF FLUE GAS, FOLLOWED BY FIVE (ONE SPARE) PULLMAN KELLOGG THIOSORBIC LIME ABSORBERS WHICH REMOVE 92.2% OF THE SO2. THE CLEANED GAS PASSES THROUGH CHEVRON MIST ELIMINATORS AND DIRECT COMBUSTION REHEATERS BEFORE DISCHARGE THROUGH A 600 FOOT INCONEL 625 LINED STACK. THE FLYASH STABILIZED SLUDGE IS PIPED TO THE EXISTING OFF SITE LANDFILL PRESENTLY USED BY UNITS ONE AND TWO. OPERATIONS COMMENCED IN JUNE, 1980.
PHILADELPHIA ELECTRIC CROMBY 1 RETROFIT 150.0 MW (GROSS) 150.0 MW (ESC) COAL 3.00 %S MAGNESIUM OXIDE UNITED ENGINEERS ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 5/83	PHILADELPHIA ELECTRIC HAS PLANS FOR THE RETROFIT OF AN FGD SYSTEM ON ONE OF THE TWO 3.0% SULFUR COAL FIRED BOILERS AT CROMBY STATION IN PHOENIXVILLE, PENNSYLVANIA. A CONTRACT HAS BEEN AWARDED TO UNITED ENGINEERS FOR A MAGNESIUM OXIDE SYSTEM. THE START UP DATE IS SET FOR 1982.
PHILADELPHIA ELECTRIC EDDYSTONE 1 RETROFIT 240.0 MW (GROSS) 240.0 MW (ESC) COAL 2.60 %S MAGNESIUM OXIDE UNITED ENGINEERS ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 12/82	UNIT 1 OF PHILADELPHIA ELECTRIC'S EDDYSTONE, PENNSYLVANIA STATION IS A BITUMINOUS COAL (2.6% S, 13,600 BTU/LB) FIRED UNIT WHICH USES ESP'S, MECHANICAL COLLECTORS, AND THREE PARTICLE SCRUBBERS (TWO ROD DECK SPRAY TOWERS AND ONE VENTURI) FOR PRIMARY PARTICLE CONTROL. THE UNIT 1 FGD SYSTEM WILL FOLLOW THE TWO ROD DECK SPRAY TOWERS. UNITED ENGINEERS IS SUPPLYING A MAGNESIUM OXIDE FGD SYSTEM FOR SO2 EMISSION CONTROL SIMILAR TO THE MAGNESIUM OXIDE PROTOTYPE SYSTEM THAT WAS PREVIOUSLY OPERATED AT THIS UNIT. OPERATIONS ARE SCHEDULED TO COMMENCE IN 1982.
PHILADELPHIA ELECTRIC EDDYSTONE 2 RETROFIT 334.0 MW (GROSS) 334.0 MW (ESC) COAL 2.50 %S MAGNESIUM OXIDE UNITED ENGINEERS ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 12/82	EDDYSTONE 2 OF PHILADELPHIA ELECTRIC IS A 2.5% SULFUR COAL FIRED BOILER LOCATED IN EDDYSTONE, PENNSYLVANIA. THE PLANT'S GENERATING CAPACITY IS 334 MW. UNITED ENGINEERS WILL SUPPLY A MAGNESIUM OXIDE FGD SYSTEM FOR EMISSION CONTROL. START UP IS SET FOR DECEMBER, 1982.
PLAINS ELECTRIC G & T COOP PLAINS ESCALANTE 1 NEW 233.0 MW (GROSS) 233.0 MW (ESC) COAL .80 %S SUBBITUMINOUS LIMESTONE COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 12/83	PLAINS ESCALANTE 1 IS A PULVERIZED SUBBITUMINOUS COAL FIRED UNIT PLANNED BY PLAINS ELECTRIC G & T COOPERATIVE TO BE LOCATED IN PREWITT, NEW MEXICO. THE 233 MW UNIT WILL UTILIZE A WET LIMESTONE SCRUBBING PROCESS FOR SO2 REMOVAL AND A FABRIC FILTER FOR PRIMARY PARTICLE CONTROL. A CONTRACT HAS BEEN AWARDED TO COMBUSTION ENGINEERING FOR THE WET LIMESTONE SYSTEM. THE UNIT INITIAL STARTUP IS PROJECTED FOR DECEMBER 1983.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
PLATTE RIVER POWER AUTHORITY RAWHIDE 1 NEW 279.0 MW (GROSS) 279.0 MW (ESC) COAL .25 %S BITUMINOUS LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER ENERGY CONSUMPTION: .0% STATUS 3 STARTUP 12/83	THE PLATTE RIVER POWER AUTHORITY HAS PLANS TO CONSTRUCT RAWHIDE 1, IN FT. COLLINS, COLORADO. THE 279 MW PULVERIZED COAL (0.25% S, 8702 BTU/LB) FIRED BOILER WILL BE SUPPLIED BY COMBUSTION ENGINEERING. A CONTRACT HAS BEEN AWARDED TO JOY MANUFACTURING/NIRO ATOMIZER FOR A DRY LIME SCRUBBING SYSTEM FOR EMISSION CONTROL. THE UTILITY IS CONSIDERING IRRIGATION DITCHES FOR LIQUID WASTE DISPOSAL. THE UNIT IS SCHEDULED TO GO ON LINE IN DECEMBER, 1983.
PUBLIC SERVICE INDIANA GIBSON 5 NEW 650.0 MW (GROSS) 650.0 MW (ESC) COAL 3.30 %S LIMESTONE PULLMAN KELLOGG ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 0/82	GIBSON 5 OF PUBLIC SERVICE OF INDIANA IS A 3.3% SULFUR COAL FIRED UNIT PLANNED FOR LOCATION IN PRINCETON, INDIANA. A CONTRACT WAS AWARDED TO PULLMAN KELLOGG FOR A LIMESTONE FGD SYSTEM CONSISTING OF FOUR KELLOGG-WEIR ABSORBER-REACTOR MODULES. SYSTEM START UP IS EXPECTED IN 1982. THE SYSTEM WILL USE KELLOGG'S PROPRIETARY MAGNESIUM-PROMOTED LIMESTONE.
PUBLIC SERVICE OF NEW MEXICO SAN JUAN 1 RETROFIT 361.0 MW (GROSS) 361.0 MW (ESC) COAL .80 %S SUBBITUMINOUS WELLMAN LORD DAVY MCKEE ENERGY CONSUMPTION: 4.4% STATUS 1 STARTUP 4/78	SAN JUAN 1 OF PUBLIC SERVICE OF NEW MEXICO IN WATERFLOW, NEW MEXICO IS A COAL (0.8% S, 8100 BTU/LB) FIRED BOILER WHICH SUPPLIES 1,319,000 ACFM OF FLUE GAS TO A RETROFIT WELLMAN LORD FGD SYSTEM BY DAVY POWERGAS. THE EMISSION CONTROL SYSTEM, OPERATIONAL SINCE APRIL OF 1978, CONSISTS OF A HOT SIDE ESP FOLLOWED BY FOUR (ONE SPARE) VENTURI SCRUBBER/SPRAY TOWER ABSORBER TRAINS WHICH WERE DESIGNED TO REMOVE 85% OF THE FLUE GAS SO2. AN INDIRECT HOT AIR REHEATER PRECEDES A BRICK LINED STACK. END PRODUCT ELEMENTAL SULFUR IS PRODUCED BY THE ALLIED CHEMICAL PROCESS. THE WATER LOOP IS CLOSED.
PUBLIC SERVICE OF NEW MEXICO SAN JUAN 2 RETROFIT 350.0 MW (GROSS) 350.0 MW (ESC) COAL .80 %S SUBBITUMINOUS WELLMAN LORD DAVY MCKEE ENERGY CONSUMPTION: 4.6% STATUS 1 STARTUP 8/78	SAN JUAN 2 OF PUBLIC SERVICE OF NEW MEXICO IN WATERFLOW, NEW MEXICO IS A COAL (0.8% S, 8100 BTU/LB) FIRED BOILER WHICH SUPPLIES 1,319,000 ACFM OF FLUE GAS TO A RETROFIT WELLMAN LORD FGD SYSTEM BY DAVY POWERGAS. THE EMISSION CONTROL SYSTEM, OPERATIONAL SINCE AUGUST OF 1978, CONSISTS OF A HOT SIDE ESP FOLLOWED BY FOUR (ONE SPARE) VENTURI SCRUBBER/SPRAY TOWER ABSORBER TRAINS WHICH WERE DESIGNED TO REMOVE 85% OF THE FLUE GAS SO2. AN INDIRECT HOT AIR REHEATER PRECEDES A BRICK LINED STACK. END PRODUCT ELEMENTAL SULFUR IS PRODUCED BY THE ALLIED CHEMICAL PROCESS. THE WATER LOOP IS CLOSED.
PUBLIC SERVICE OF NEW MEXICO SAN JUAN 3 NEW 534.0 MW (GROSS) 534.0 MW (ESC) COAL .80 %S SUBBITUMINOUS WELLMAN LORD DAVY MCKEE ENERGY CONSUMPTION: 3.6% STATUS 1 STARTUP 12/79	SAN JUAN 3 IS A COAL (0.8% S, 8100 BTU/LB) FIRED UNIT OF THE PUBLIC SERVICE OF NEW MEXICO AND IS LOCATED IN WATERFLOW, NEW MEXICO. THE FGD SYSTEM, SUPPLIED BY DAVY POWERGAS IS AN INTEGRATION OF THE WELLMAN LORD SO2 RECOVERY PROCESS AND ALLIED CHEMICAL'S SO2 REDUCTION TO SULFUR PROCESS. FIVE (ONE SPARE) VENTURI SCRUBBER/SPRAY TOWER ABSORBER (90% DESIGN SO2 REMOVAL) TRAINS FOLLOW A HOT SIDE ESP. AN INDIRECT HOT AIR REHEATER BOOSTS THE GAS TEMPERATURE 50 DEG F. THE SYSTEM OPERATES IN A CLOSED WATER LOOP MODE. OPERATIONS COMMENCED IN DECEMBER, 1979.
PUBLIC SERVICE OF NEW MEXICO SAN JUAN 4 NEW 534.0 MW (GROSS) 534.0 MW (ESC) COAL .80 %S SUBBITUMINOUS WELLMAN LORD DAVY MCKEE ENERGY CONSUMPTION: 3.6% STATUS 2 STARTUP 6/82	SAN JUAN 4 IS A COAL (0.8% S, 8100 BTU/LB) FIRED UNIT OF THE PUBLIC SERVICE OF NEW MEXICO UNDER CONSTRUCTION IN WATERFLOW, NEW MEXICO. THE FGD SYSTEM BEING SUPPLIED BY DAVY POWERGAS IS AN INTEGRATION OF THE WELLMAN LORD SO2 RECOVERY PROCESS AND ALLIED CHEMICAL'S SO2 REDUCTION TO SULFUR PROCESS. FIVE (ONE SPARE) VENTURI SCRUBBER/SPRAY TOWER ABSORBER (90% DESIGN SO2 REMOVAL) TRAINS WILL FOLLOW A HOT SIDE ESP. AN INDIRECT HOT AIR REHEATER WILL BOOST THE GAS TEMPERATURE 50 DEG F. THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP MODE. START UP IS EXPECTED IN JUNE, 1982.

UNIT IDENTIFICATION	ABSTRACT
PWR AUTHORITY OF STATE OF NY FOSSIL NEW 700.0 MW (GROSS) 700.0 MW (ESC) COAL 3.00 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 11/87	THE POWER AUTHORITY OF NEW YORK PLANS A NEW 3.0% SULFUR COAL FIRED UNIT WHICH WILL BE LOCATED AT THE ARTHUR KILL FACILITY ON STATEN ISLAND. THE UTILITY IS PRESENTLY CONSIDERING FGD SYSTEMS FOR THIS UNIT. PUBLIC SERVICE COMMISSION HEARINGS ARE CURRENTLY IN PROGRESS. START UP IS EXPECTED IN NOVEMBER, 1987.
SALT RIVER PROJECT CORONADO 1 NEW 350.0 MW (GROSS) 280.0 MW (ESC) COAL 1.00 %S SUBBITUMINOUS LIMESTONE PULLMAN KELLOGG ENERGY CONSUMPTION: 4.3% STATUS 1 STARTUP 11/79	SALT RIVER PROJECT'S CORONADO 1 IS A DRY BOTTOM PULVERIZED SUBBITUMINOUS COAL (1.0% S, 8300 BTU/LB) FIRED BOILER LOCATED IN ST. JOHNS, ARIZONA. PULLMAN KELLOGG SUPPLIED THE TWO LIMESTONE HORIZONTAL WEIR SPRAY TOWERS WHICH WILL REMOVE 82.5% OF THE SO2 FROM THE FLUE GAS PASSED THROUGH THEM. VERTICAL HEIL MIST ELIMINATORS PRECEDE A 500 FOOT STACK. A MINIMUM OF 20% BYPASS PROVIDES REHEAT. THE WATER LOOP IS AN OPEN MODE, AND THE UNSTABILIZED SLUDGE IS DISPOSED IN AN UNLINED POND. START UP WAS IN NOVEMBER, 1979.
SALT RIVER PROJECT CORONADO 2 NEW 350.0 MW (GROSS) 280.0 MW (ESC) COAL 1.00 %S SUBBITUMINOUS LIMESTONE PULLMAN KELLOGG ENERGY CONSUMPTION: 4.3% STATUS 2 STARTUP 7/80	SALT RIVER PROJECT'S CORONADO 2 IS A DRY BOTTOM PULVERIZED SUBBITUMINOUS COAL (1.0% S, 8300 BTU/LB) FIRED BOILER UNDER CONSTRUCTION IN ST. JOHNS, ARIZONA. PULLMAN KELLOGG IS SUPPLYING TWO LIMESTONE HORIZONTAL WEIR SPRAY TOWERS WHICH WILL REMOVE 82.5% OF THE SO2 FROM THE FLUE GAS PASSED THROUGH THEM. VERTICAL HEIL MIST ELIMINATORS PRECEDE A 500 FOOT STACK. A MINIMUM OF 20% BYPASS WILL PROVIDE REHEAT. THE WATER LOOP WILL BE OPEN, AND THE UNSTABILIZED SLUDGE WILL BE DISPOSED IN AN UNLINED POND. START UP IS EXPECTED IN JULY, 1980.
SALT RIVER PROJECT CORONADO 3 NEW 400.0 MW (GROSS) 280.0 MW (ESC) COAL .60 %S SUBBITUMINOUS LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: 3.8% STATUS 6 STARTUP 1/88	CORONADO 3 IS A DRY BOTTOM PULVERIZED SUBBITUMINOUS COAL (.60% S, 8300 BTU/LB) FIRED UNIT PLANNED BY SALT RIVER PROJECT TO BE LOCATED IN ST. JOHN'S, ARIZONA. THE UTILITY IS PRESENTLY CONSIDERING THE INSTALLATION OF TWO HORIZONTAL SPRAY TOWERS UTILIZING LIMESTONE AS THE ABSORBENT. PLANS FOR AN EMISSION CONTROL SYSTEM HAVE NOT BEEN FINALIZED. THE SYSTEM WILL HAVE A 20% BYPASS REHEAT, AND THE SLUDGE WILL PROBABLY BE PONDED. SCHEDULED OPERATION DATE IS 1988.
SAN MIGUEL ELECTRIC COOP SAN MIGUEL 1 NEW 400.0 MW (GROSS) 400.0 MW (ESC) COAL 1.70 %S LIGNITE LIMESTONE BABCOCK & WILCOX ENERGY CONSUMPTION: 5.0% STATUS 2 STARTUP 10/80	SAN MIGUEL 1 OF THE SAN MIGUEL ELECTRIC COOP IS A LIGNITE (1.7% S, 5000 BTU/LB) FIRED RADIANT BOILER UNDER CONSTRUCTION IN SAN MIGUEL, TEXAS. THE EMISSION CONTROL SYSTEM ON THIS UNIT WILL CONSIST OF A COLD SIDE ESP FOLLOWED BY FOUR BABCOCK AND WILCOX 86% EFFICIENT LIMESTONE TCA MODULES. CHEVRON MIST ELIMINATORS WILL PRECEDE AN IN-LINE REHEATER AND AN ACID BRICK LINED STACK. THE WATER LOOP WILL BE CLOSED, AND THE DEWATERED SLURRY WILL BE MIXED WITH FLYASH BY RESEARCH COTTRELL AND DISPOSED IN AN OFF SITE LANDFILL.
SEMINOLE ELECTRIC SEMINOLE 1 NEW 620.0 MW (GROSS) 620.0 MW (ESC) COAL 2.75 %S SUBBITUMINOUS LIMESTONE PEABODY PROCESS SYSTEMS ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 3/83	SEMINOLE 1 OF SEMINOLE ELECTRIC IS A COAL (2.75% S, 11,700 BTU/LB) FIRED UNIT PLANNED FOR LOCATION IN PALATKA, FLORIDA. THE EMISSION CONTROL SYSTEM WILL CONSIST OF ESP'S AND A LIMESTONE FGD SYSTEM. THE FGD SYSTEM WILL BE SUPPLIED BY PEABODY PROCESS SYSTEMS. START UP IS EXPECTED IN MARCH OF 1983.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
SEMINOLE ELECTRIC SEMINOLE 2 NEW 620.0 MW (GROSS) 620.0 MW (ESC) COAL 2.75 %S SUBBITUMINOUS LIMESTONE PEABODY PROCESS SYSTEMS ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 3/85	SEMINOLE 2 OF SEMINOLE ELECTRIC IS A COAL (2.75% S, 11,700 BTU/LB) FIRED UNIT PLANNED FOR LOCATION IN PALATKA, FLORIDA. THE EMISSION CONTROL SYSTEM WILL CONSIST OF ESP'S AND A LIMESTONE FGD SYSTEM. THE FGD SYSTEM WILL BE SUPPLIED BY PEABODY SYSTEMS. START UP IS EXPECTED IN MARCH OF 1985.
SIERRA PACIFIC POWER VALMY 2 NEW 276.0 MW (GROSS) 276.0 MW (ESC) COAL ***** %S LIME/SPRAY DRYING VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 7 STARTUP 8/84	SIERRA PACIFIC POWER HAS PLANS TO CONSTRUCT A 276 MW UNIT TO BE LOCATED IN VALMY, NEVADA. THE FOSTER WHEELER PULVERIZED COAL FIRED BOILER AT THE VALMY 2 STATION WILL UTILIZE AN FGD SYSTEM OR FIRE LOW SULFUR COAL TO CONTROL SO2 EMISSIONS. IF FGD IS SELECTED, A DRY LIME SYSTEM WILL BE THE UNIT IS SCHEDULED TO COMMENCE OPERATIONS IN AUGUST, 1984.
SIKESTON BOARD OF MUNIC. UTIL. SIKESTON 1 NEW 235.0 MW (GROSS) 235.0 MW (ESC) COAL 2.80 %S LIMESTONE BABCOCK & WILCOX ENERGY CONSUMPTION: 1.6% STATUS 2 STARTUP 1/81	THE SIKESTON BOARD OF MUNICIPAL UTILITIES' SIKESTON 1 IS A PULVERIZED COAL (2.8% S, 11,340 BTU/LB) FIRED BOILER UNDER CONSTRUCTION IN SIKESTON, MISSOURI. BABCOCK AND WILCOX IS SUPPLYING AN EMISSION CONTROL SYSTEM CONSISTING OF TWO ESP'S AND THREE 50% CAPACITY LIMESTONE VENTURI FGD MODULES. THE CLEANED GAS WILL PASS THROUGH CHEVRON MIST ELIMINATORS BEFORE EXITING A 450 FOOT FRP LINED FLUE (A SECOND CARBON STEEL LINED FLUE, USED FOR EMERGENCY BYPASS, IS ALSO IN THE STACK). THE WATER LOOP WILL BE OPEN, AND THE SLUDGE WILL BE PONDED. START UP IS SLATED FOR JANUARY, 1981.
SOUTH CAROLINA PUBLIC SERVICE CROSS 1 NEW 500.0 MW (GROSS) 500.0 MW (ESC) COAL 1.80 %S BITUMINOUS LIMESTONE PEABODY PROCESS SYSTEMS ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 3/85	SOUTH CAROLINA PUBLIC SERVICE HAS PLANS TO CONSTRUCT TWO NEW UNITS, CROSS 1 AND 2, TO BE LOCATED IN CROSS, SOUTH CAROLINA. EACH 500 MW BOILER WILL FIRE COAL WITH A SULFUR CONTENT RANGING BETWEEN 1.0 AND 2.3%. THE UTILITY HAS SIGNED A CONTRACT WITH PEABODY PROCESS SYSTEMS FOR THE INSTALLATION OF A WET LIMESTONE SCRUBBING SYSTEM TO CONTROL SO2 EMISSIONS. UNIT 1 IS SCHEDULED TO COMMENCE OPERATIONS IN MARCH, 1985.
SOUTH CAROLINA PUBLIC SERVICE CROSS 2 NEW 500.0 MW (GROSS) 500.0 MW (ESC) COAL 1.80 %S BITUMINOUS LIMESTONE PEABODY PROCESS SYSTEMS ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 11/83	SOUTH CAROLINA PUBLIC SERVICE HAS PLANS TO CONSTRUCT TWO NEW UNITS, CROSS 1 AND 2, TO BE LOCATED IN CROSS, SOUTH CAROLINA. EACH 500 MW BOILER WILL FIRE COAL WITH A SULFUR CONTENT RANGING BETWEEN 1.0 AND 2.3%. THE UTILITY HAS SIGNED A CONTRACT WITH PEABODY PROCESS SYSTEMS FOR THE INSTALLATION OF A WET LIMESTONE SCRUBBING SYSTEM TO CONTROL SO2 EMISSIONS. UNIT 2 IS SCHEDULED TO COMMENCE OPERATIONS IN NOVEMBER, 1983.
SOUTH CAROLINA PUBLIC SERVICE WINYAH 2 NEW 280.0 MW (GROSS) 140.0 MW (ESC) COAL 1.70 %S BITUMINOUS LIMESTONE BABCOCK & WILCOX ENERGY CONSUMPTION: 1.1% STATUS 1 STARTUP 7/77	WINYAH 2 OF SOUTH CAROLINA PUBLIC SERVICE IS A PULVERIZED BITUMINOUS COAL (1.70% S, 11,500 BTU/LB) FIRED UNIT LOCATED IN GEORGETOWN, SOUTH CAROLINA. A COLD SIDE ESP AND A BABCOCK AND WILCOX VENTURI SCRUBBER/LIMESTONE TRAY TOWER ABSORBER TRAIN DESIGNED TO REMOVE 69% OF THE SO2 FROM THE BOILER FLUE GAS MAKE UP THE EMISSION CONTROL SYSTEM ON THIS UNIT. THE SYSTEM OPERATES IN AN OPEN WATER LOOP, AND THE SLUDGE IS DISPOSED IN AN ON-SITE UNLINED POND. THIS SYSTEM HAS BEEN OPERATIONAL SINCE JULY OF 1977.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
SOUTH CAROLINA PUBLIC SERVICE WINYAH 3 NEW 280.0 MW (GROSS) 280.0 MW (ESC) COAL 1.70 %S LIMESTONE BABCOCK & WILCOX ENERGY CONSUMPTION: 2.1% STATUS 1 STARTUP 5/80	WINYAH 3 OF SOUTH CAROLINA PUBLIC SERVICE IS A DRY BOTTOM BOILER WHICH FIRES 1.7% SULFUR COAL (11,500 BTU/LB) AND IS LOCATED IN GEORGETOWN, SOUTH CAROLINA. AN ESP PRECEDES A BABCOCK AND WILCOX LIMESTONE FGD SYSTEM AND AN INDIRECT STEAM REHEATER. THE SYSTEM OPERATES IN A CLOSED WATER LOOP MODE. OPERATIONS COMMENCED IN MAY, 1980.
SOUTH CAROLINA PUBLIC SERVICE WINYAH 4 NEW 280.0 MW (GROSS) 280.0 MW (ESC) COAL 1.70 %S BITUMINOUS LIMESTONE AMERICAN AIR FILTER ENERGY CONSUMPTION: 2.1% STATUS 2 STARTUP 7/81	SOUTH CAROLINA PUBLIC SERVICE'S WINYAH 4 IS A BITUMINOUS COAL (1.70% S, 11,500 BTU/LB) FIRED UNIT UNDER CONSTRUCTION IN GEORGETOWN, SOUTH CAROLINA. TWO AMERICAN AIR FILTER LIMESTONE SLURRY SPRAY TOWERS WILL FOLLOW AN ESP. THE TEMPERATURE OF THE CLEANED GAS WILL BE RAISED BY AN INDIRECT STEAM REHEATER. THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP MODE. START UP IS EXPECTED IN JULY, 1981.
SOUTH MISSISSIPPI ELEC PWR R.D. MORROW 1 NEW 200.0 MW (GROSS) 124.0 MW (ESC) COAL 1.30 %S BITUMINOUS LIMESTONE ENVIRONEERING, RILEY STOKER ENERGY CONSUMPTION: 5.5% STATUS 1 STARTUP 8/78	R.D. MORROW 1 OF SOUTHERN MISSISSIPPI ELECTRIC IS A PULVERIZED COAL (1.3% S, 12,000 BTU/LB) FIRED UNIT IN HATTISBURG, MISSISSIPPI. THE EMISSION CONTROL SYSTEM FOR THIS UNIT CONSISTS OF A HOT SIDE ESP FOLLOWED BY A LIMESTONE VENTRI-ROD ABSORBER SUPPLIED BY RILEY STOKER/ENVIRONEERING. AFTER THE CLEANED GAS PASSES THROUGH A VERTICAL CHEVRON MIST ELIMINATOR, IT IS JOINED BY A 38% BYPASS REHEAT BEFORE IT IS DISCHARGED THROUGH A 408 FOOT STACK SHARED BY UNITS 1 AND 2 (EACH UNIT HAS ITS OWN ACID BRICK LINED FLUE). THE WATER LOOP IS CLOSED, AND THE FLYASH STABILIZED SLUDGE IS HAULED BY TRUCK TO AN OFF SITE LANDFILL. THE SYSTEM HAS BEEN OPERATIONAL SINCE AUGUST OF 1978.
SOUTH MISSISSIPPI ELEC PWR R.D. MORROW 2 NEW 200.0 MW (GROSS) 124.0 MW (ESC) COAL 1.30 %S BITUMINOUS LIMESTONE ENVIRONEERING, RILEY STOKER ENERGY CONSUMPTION: 5.5% STATUS 1 STARTUP 6/79	R.D. MORROW 2 OF SOUTHERN MISSISSIPPI ELECTRIC IS A PULVERIZED COAL (1.3% S, 12,000 BTU/LB) FIRED UNIT IN HATTISBURG, MISSISSIPPI. THE EMISSION CONTROL SYSTEM FOR THIS UNIT CONSISTS OF A HOT SIDE ESP FOLLOWED BY A LIMESTONE VENTRI-ROD ABSORBER SUPPLIED BY RILEY STOKER/ENVIRONEERING. AFTER THE CLEANED GAS PASSES THROUGH A VERTICAL CHEVRON MIST ELIMINATOR, IT IS JOINED BY A 38% BYPASS REHEAT BEFORE IT IS DISCHARGED THROUGH A 408 FOOT STACK SHARED BY UNITS 1 AND 2 (EACH UNIT HAS ITS OWN ACID BRICK LINED FLUE). THE WATER LOOP IS CLOSED, AND THE FLYASH STABILIZED SLUDGE IS HAULED BY TRUCK TO AN OFF SITE LANDFILL. THE SYSTEM HAS BEEN OPERATIONAL SINCE JUNE OF 1979.
SOUTHERN ILLINOIS POWER COOP MARION 4 NEW 184.0 MW (GROSS) 184.0 MW (ESC) COAL/REFUS 3.50 %S LIMESTONE BABCOCK & WILCOX ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 5/79	UNIT 4 AT SOUTHERN ILLINOIS POWER COOP'S MARION STATION IN MARION, ILLINOIS IS A CYCLONE FIRED COAL (3.5% S, 9000 BTU/LB) BOILER WHICH IS SERVED BY A 89.4% EFFICIENT (DESIGN) LIMESTONE FGD SYSTEM SUPPLIED BY BABCOCK AND WILCOX. TWO SPRAY TOWERS AND A BRICK LINED STACK ARE DOWNSTREAM OF AN ESP IN THIS SYSTEM. THE WATER LOOP IS OPEN, AND THE FLYASH STABILIZED SLUDGE IS DEWATERED AND LANDFILLED. THE SYSTEM BECAME OPERATIONAL DURING MAY OF 1979.
SOUTHERN ILLINOIS POWER COOP MARION 5 NEW 300.0 MW (GROSS) 300.0 MW (ESC) COAL 3.00 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/86	MARION 5 IS A COAL (3.0% S, 9000 BTU/LB) FIRED UNIT PLANNED BY SOUTHERN ILLNOIS POWER COOP FOR LOCATION IN MARION, ILLINOIS. THE UTILITY HAS NOT YET DECIDED ON AN FGD PROCESS AS IT IS WAITING FOR THE FINALIZATION OF THE SO2 REGULATIONS THE UNIT WILL HAVE TO MEET. START UP IS EXPECTED IN 1986.

UNIT IDENTIFICATION	ABSTRACT
SOUTHERN INDIANA GAS & ELEC A.B. BROWN 1 NEW 265.0 MW (GROSS) 265.0 MW (ESC) COAL 3.35 %S BITUMINOUS DUAL ALKALI FMC ENERGY CONSUMPTION: .8% STATUS 1 STARTUP 4/79	SOUTHERN INDIANA GAS AND ELECTRIC'S A.B.BROWN 1 IS A DRY BOTTOM PULVERIZED COAL (3.35% S, 13,010 BTU/LB) FIRED UNIT IN WEST FRANKLIN, INDIANA. FMC SUPPLIED A DUAL ALKALI FGD SYSTEM DESIGNED TO REMOVE 85% OF THE FLUE GAS SO2. THE UNIT CONSISTS OF TWO THREE STAGE DISC CONTACTORS. A COLD SIDE ESP PROVIDES PRIMARY PARTICULATE CONTROL, AND ONE CHEVRON MIST ELIMINATOR/MODULE PRECEDES A 498 FOOT ACID BRICK LINED STACK. THE SYSTEM PRODUCES A FILTER CAKE WASTE PRODUCT WHICH IS DISPOSED IN AN ON SITE LANDFILL. THE WATER LOOP CAN BE EITHER OPEN OR CLOSED. THE SYSTEM HAS BEEN OPERATIONAL SINCE MARCH OF 1979.
SOUTHWESTERN ELECTRIC POWER HENRY W. PIRKEY 1 NEW 720.0 MW (GROSS) 720.0 MW (ESC) COAL .80 %S LIGNITE LIMESTONE AIR CORRECTION DIVISION, UOP ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 12/84	HENRY W. PIRKEY 1 IS A WET BOTTOM LIGNITE (0.8% S, 6300 BTU/LB) FIRED UNIT PLANNED BY SOUTHWESTERN ELECTRIC POWER FOR LOCATION IN HALLSVILLE, TEXAS. A CONTRACT HAS BEEN AWARDED TO THE AIR CORRECTION DIVISION OF UOP FOR FOUR LIMESTONE SPRAY TOWERS (99+% EFFICIENCY). MIST ELIMINATION WILL BE PROVIDED BY TWO STAGE CHEVRONS, AND THE STACK WILL BE ACID BRICK LINED. NO REHEAT IS PLANNED. THE WATER LOOP WILL BE CLOSED, AND THE SLUDGE WILL BE POZ-O-TEC STABILIZED. START UP IS EXPECTED BY DECEMBER, 1984.
SPRINGFIELD CITY UTILITIES SOUTHWEST 1 NEW 194.0 MW (GROSS) 194.0 MW (ESC) COAL 3.50 %S BITUMINOUS LIMESTONE AIR CORRECTION DIVISION, UOP ENERGY CONSUMPTION: 4.6% STATUS 1 STARTUP 4/77	SPRINGFIELD CITY UTILITIES' SOUTHWEST 1 IS A PULVERIZED BITUMINOUS COAL (3.5% S, 12,500 BTU/LB) FIRED BOILER LOCATED IN SPRINGFIELD, MISSOURI. THE EMISSION CONTROL SYSTEM FOR THIS UNIT CONSISTS OF A COLD SIDE ESP FOLLOWED BY TWO UOP LIMESTONE TCA MODULES WHICH WERE DESIGNED TO REMOVE 80% OF THE FLUE GAS SO2. ONE CHEVRON/MODULE LEADS TO A 384 FOOT CEILCOTE LINED STACK. THE DRY FLYASH STABILIZED SLUDGE IS DEWATERED BY A ROTARY DRUM VACUUM AND TRUCKED TO A LANDFILL. THE SYSTEM HAS BEEN OPERATIONAL SINCE APRIL, 1977.
SPRINGFIELD WATER, LIGHT & PWR DALLMAN 3 NEW 205.0 MW (GROSS) 205.0 MW (ESC) COAL 3.30 %S LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 5.9% STATUS 2 STARTUP 11/80	DALLMAN 3 OF SPRINGFIELD WATER, LIGHT, AND POWER IS A PULVERIZED COAL (3.3% S, 10,500 BTU/LB) FIRED BOILER UNDER CONSTRUCTION IN SPRINGFIELD, ILLINOIS. RESEARCH COTTRELL IS SUPPLYING A LIMESTONE FGD SYSTEM DESIGNED TO REMOVE 95% OF THE SO2 FROM 850,000 ACFM OF BOILER FLUE GAS. A HOT SIDE ESP WILL PRECEDE TWO PACKED TOWER ABSORBERS, ONE HORIZONTAL CHEVRON PER MODULE, AND A 500 FOOT ACID BRICK LINED STACK. NO REHEAT WILL BE PROVIDED. A SLUDGE DISPOSAL STRATEGY HAS NOT BEEN FINALIZED, BUT THE UTILITY IS CONSIDERING EITHER PONDING OR LANDFILL. FGD OPERATIONS SHOULD BEGIN IN NOVEMBER, 1980.
ST. JOE ZINC G.F. WEATON 1 RETROFIT 60.0 MW (GROSS) 60.0 MW (ESC) COAL 2.00 %S BITUMINOUS CITRATE MORRISON & KNUDSEN/U.S.B.M. ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 11/79	G.F. WEATON 1, OWNED BY ST. JOE ZINC, IS A COAL (2.0% S, 12,500 BTU/LB) FIRED BOILER LOCATED IN MONACA, PENNSYLVANIA. THE BUREAU OF MINES RETROFITTED A PROTOTYPE CITRATE FGD SYSTEM ON THIS UNIT, WHICH PROVIDES POWER FOR THE LOCAL UTILITY GRID. ONE VENTURI SCRUBBER/ABSORBER TRAIN FOLLOWS A COLD SIDE ESP. TWO CHEVRON MIST ELIMINATORS ARE FOLLOWED BY A COMBINATION OF INDIRECT HOT AIR AND DIRECT COMBUSTION REHEATERS, AND A 102 FOOT FIBERGLASS LINED SCRUBBER STACK. THE SYSTEM SO2 REMOVAL EFFICIENCY WILL BE OVER 90%. THE WATER LOOP IS CLOSED LOOP MODE. THE FGD SYSTEM COMMENCED OPERATION IN NOVEMBER OF 1979.
SUNFLOWER ELECTRIC COOP HOLCOMB 1 NEW 347.0 MW (GROSS) 347.0 MW (ESC) COAL .47 %S SUBBITUMINOUS LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 0/83	SUNFLOWER ELECTRIC COOP'S HOLCOMB 1 STATION IS A 347 MW UNIT UNDER CONSTRUCTION IN HOLCOMB, KANSAS. THE PULVERIZED COAL (0.47% S, 8800 BTU/LB) FIRED BABCOCK AND WILCOX BOILER WILL UTILIZE A JOY MANUFACTURING/NIRO ATOMIZER DRY SCRUBBING PROCESS FOR SO2 CONTROL. A FABRIC FILTER WILL BE UTILIZED FOR PRIMARY PARTICLE CONTROL. THE UNIT IS SCHEDULED TO COMMENCE OPERATIONS IN THE FALL OF 1983.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
TAMPA ELECTRIC BIG BEND 4 NEW 475.0 MW (GROSS) 475.0 MW (ESC) COAL 2.35 %S LIME/LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 2.1% STATUS 3 STARTUP 12/84	UNIT 4 AT TAMPA ELECTRIC'S BIG BEND STATION IS A PLANNED DRY BOTTOM PULVERIZED COAL (2.35% S, 10,300 BTU/LB) FIRED UNIT TO BE LOCATED IN TAMPA, FLORIDA. A CONTRACT HAS BEEN AWARDED TO RESEARCH-COTTRELL FOR A WET LIME/LIMESTONE SCRUBBING PROCESS. AN ESP WILL PROVIDE PRIMARY PARTICULATE CONTROL. THE FGD SYSTEM, WHICH WILL REMOVE 90% OF THE FLUE GAS SO2, WILL INCLUDE AN INDIRECT HOT AIR REHEATER LEADING TO A 490 FOOT CONCRETE LINED STACK. THE UNIT WILL PRODUCE GYPSUM AS A SALEABLE PRODUCT.
TENNESSEE VALLEY AUTHORITY JOHNSONVILLE 1-10 RETROFIT 1450.0 MW (GROSS) 600.0 MW (ESC) COAL 3.10 %S MAGNESIUM OXIDE ENVIRONEERING, RILEY STOKER ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 12/81	UNITS 1 THROUGH 10 AT JOHNSONVILLE STATION OF TVA ARE COAL (3.1% S, 10,750 BTU/LB) FIRED BOILERS LOCATED IN NEW JOHNSONVILLE, TENNESSEE. UNITED ENGINEERS HAS BEEN AWARDED A CONTRACT TO PROVIDE ENGINEERING ASSISTANCE TO TVA FOR A 90% EFFICIENT MAGNESIUM OXIDE FGD SYSTEM TO BE RETROFITTED ON THESE UNITS. SULFURIC ACID WILL BE PRODUCED AS A BYPRODUCT FROM THIS SYSTEM, WHICH WILL FEATURE FOUR VENTURI SCRUBBER/ABSORBER TRAINS (ONE SPARE), 60% BYPASS REHEAT, AND A 600 FOOT STACK. START UP IS EXPECTED IN 1981.
TENNESSEE VALLEY AUTHORITY PARADISE 1 RETROFIT 704.0 MW (GROSS) 704.0 MW (ESC) COAL 4.20 %S LIMESTONE CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 3/82	PARADISE 1 OF TVA IS A 4.2% SULFUR COAL FIRED UNIT LOCATED IN PARADISE, KENTUCKY. A CONTRACT HAS BEEN AWARDED TO CHEMICO FOR AN 84.2% EFFICIENT LIMESTONE FGD SYSTEM TO BE RETROFITTED ON THIS BOILER. SIX VENTURI SCRUBBERS AND VENTURI ABSORBER TRAINS WILL FOLLOW AN ESP. INLET FLUE GAS WILL BE USED TO HEAT WATER, WHICH IN TURN WILL BE USED TO REHEAT THE OUTLET FLUE GAS. FORCED OXIDATION WILL BE USED IN ONE MODULE TO CONTROL SCALING THROUGHOUT THE SYSTEM. THE UTILITY EXPECTS TO GET AN 80% SOLIDS LANDFILLABLE GRADE SLUDGE. OPERATIONS SHOULD START IN MARCH, 1982.
TENNESSEE VALLEY AUTHORITY PARADISE 2 RETROFIT 704.0 MW (GROSS) 704.0 MW (ESC) COAL 4.20 %S LIMESTONE CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 6/82	PARADISE 2 OF TVA IS A 4.2% SULFUR COAL FIRED UNIT LOCATED IN PARADISE, KENTUCKY. A CONTRACT HAS BEEN AWARDED TO CHEMICO FOR AN 84.2% EFFICIENT LIMESTONE FGD SYSTEM TO BE RETROFITTED ON THIS BOILER. SIX VENTURI SCRUBBERS AND VENTURI ABSORBER TRAINS WILL FOLLOW AN ESP. INLET FLUE GAS WILL BE USED TO HEAT WATER, WHICH IN TURN WILL BE USED TO REHEAT THE OUTLET FLUE GAS. FORCED OXIDATION WILL BE USED IN ONE MODULE TO CONTROL SCALING THROUGHOUT THE SYSTEM. THE UTILITY EXPECTS TO GET AN 80% SOLIDS LANDFILLABLE GRADE SLUDGE. OPERATIONS SHOULD START IN JUNE, 1982.
TENNESSEE VALLEY AUTHORITY SHAWNEE 10A RETROFIT 10.0 MW (GROSS) 10.0 MW (ESC) COAL 2.90 %S BITUMINOUS LIME/LIMESTONE AIR CORRECTION DIVISION, UOP ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 4/72	SHAWNEE 10 OF TVA IS A 2.9% SULFUR BITUMINOUS COAL FIRED BOILER LOCATED IN PADUCAH, KENTUCKY. MODULE 10A IS A RETROFIT PROTOTYPE LIME/LIMESTONE TCA SYSTEM SUPPLIED BY THE AIR CORRECTION DIVISION, UOP. THE SYSTEM UTILIZES A CHEVRON MIST ELIMINATOR AND A DIRECT COMBUSTION REHEATER, AND OPERATES IN A CLOSED WATER LOOP. THIS TEST PROGRAM IS FUNDED BY THE EPA WITH TVA AS THE CONSTRUCTOR AND FACILITY OPERATOR. THE BECHTEL CORP. OF SAN FRANCISCO IS THE MAJOR CONTRACTOR, TEST DIRECTOR, AND REPORT WRITER. THE SYSTEM HAS BEEN OPERATIONAL SINCE APRIL, 1972.
TENNESSEE VALLEY AUTHORITY SHAWNEE 10B RETROFIT 10.0 MW (GROSS) 10.0 MW (ESC) COAL 2.90 %S BITUMINOUS LIME/LIMESTONE CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 4/72	SHAWNEE 10 OF TVA IS A 2.9% SULFUR BITUMINOUS COAL FIRED BOILER LOCATED IN PADUCAH, KENTUCKY. MODULE 10B IS A RETROFIT PROTOTYPE LIME/LIMESTONE VENTURI SCRUBBER/SPRAY TOWER ABSORBER SUPPLIED BY CHEMICO. THE SYSTEM, OPERATIONAL SINCE APRIL, 1972, INCLUDES A CHEVRON MIST ELIMINATOR AND A DIRECT COMBUSTION REHEATER, AND OPERATES IN A CLOSED WATER LOOP. THIS TEST PROGRAM IS FUNDED BY THE EPA WITH TVA AS THE CONSTRUCTOR AND FACILITY OPERATOR. THE BECHTEL CORP. OF SAN FRANCISCO IS THE MAJOR CONTRACTOR, TEST DIRECTOR, AND REPORT WRITER.

UNIT IDENTIFICATION	ABSTRACT
TENNESSEE VALLEY AUTHORITY WIDOWS CREEK 7 RETROFIT 575.0 MW (GROSS) 575.0 MW (ESC) COAL 3.70 %S BITUMINOUS LIMESTONE COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 9/81	WIDOWS CREEK 7 IS A PULVERIZED BITUMINOUS COAL (3.7% S, 11,100 BTU/LB) FIRED BOILER OF TVA LOCATED IN BRIDGEPORT, ALABAMA. COMBUSTION ENGINEERING IS PRESENTLY RETROFITTING A LIMESTONE VENTRI ROD SCRUBBER/SPRAY TOWER ABSORBER FGD SYSTEM ON THIS UNIT. AN ESP WILL PRECEDE THE SCRUBBING TRAIN, AND A COMBINATION OF A BULK ENTRAINMENT SEPARATOR, TWO CHEVRON MIST ELIMINATORS AND A FINNED TUBE REHEATER FOLLOW THE SYSTEM. THE SCRUBBER SLUDGE WILL BE DISPOSED IN A SLUDGE POND. CONSTRUCTION BEGAN IN SEPTEMBER, 1978, AND START UP IS EXPECTED IN SEPTEMBER, 1981.
TENNESSEE VALLEY AUTHORITY WIDOWS CREEK 8 RETROFIT 550.0 MW (GROSS) 550.0 MW (ESC) COAL 3.70 %S LIMESTONE TENNESSEE VALLEY AUTHORITY ENERGY CONSUMPTION: 4.7% STATUS 1 STARTUP 5/77	WIDOWS CREEK 8 OF TVA IS A BALANCED DRAFT, TANGENTIALLY FIRED COAL (3.7% S, 10,000 BTU/LB) BOILER IN BRIDGEPORT, ALABAMA. TVA RETROFITTED THIS UNIT WITH A LIMESTONE FGD SYSTEM (80% DESIGN SO2 REMOVAL EFFICIENCY) WHICH BEGAN OPERATIONS IN MAY, 1977. AN ESP PRECEDES FOUR VARIABLE THROAT VENTURI SCRUBBER/MULTIGRID TOWER ABSORBER TRAINS (ONE OF THE TOWERS IS PACKED). ONE VERTICAL CHEVRON/TRAIN AND AN INDIRECT HOT AIR REHEATER ARE INCLUDED IN THE SYSTEM. SLUDGE FROM THE FGD SYSTEM IS PONDED.
TEXAS MUNICIPAL POWER AGENCY GIBBONS CREEK 1 NEW 400.0 MW (GROSS) 400.0 MW (ESC) COAL 1.06 %S LIGNITE LIMESTONE COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 1/82	GIBBONS CREEK 1 OF THE TEXAS MUNICIPAL POWER AGENCY IS A DRY BOTTOM PULVERIZED LIGNITE (1.06% S, 4860 BTU/LB) FIRED UNIT PLANNED FOR LOCATION IN CARLOS, TEXAS. THE EMISSION CONTROL SYSTEM WILL CONSIST OF A COLD SIDE ESP FOLLOWED BY THREE 50% CAPACITY LIMESTONE SPRAY TOWERS. A CONTRACT HAS BEEN AWARDED TO COMBUSTION ENGINEERING FOR THE FGD SYSTEM, WHICH INCLUDES A CHEVRON MIST ELIMINATOR AND A STEAM COIL REHEATER. CLEANED FLUE GAS WILL BE DISCHARGED THROUGH A 465 FOOT ACID BRICK LINED STACK. THE POZ-O-TEC STABILIZED SLUDGE WILL BE USED AS STRIP MINE LANDFILL. START UP IS EXPECTED IN JANUARY, 1982.
TEXAS POWER & LIGHT SANDOW 4 NEW 545.0 MW (GROSS) 382.0 MW (ESC) COAL 1.60 %S LIGNITE LIMESTONE COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 9/80	SANDOW 4 IS A PULVERIZED 1.6% SULFUR LIGNITE FIRED BOILER OF TEXAS POWER AND LIGHT UNDER CONSTRUCTION IN ROCKDALE, TEXAS. COMBUSTION ENGINEERING IS SUPPLYING THREE LIMESTONE SPRAY TOWERS FOR THIS UNIT. A COLD SIDE ESP WILL PROVIDE PRIMARY PARTICULATE CONTROL. A 30% BYPASS REHEAT WILL BE USED, AND THE OVERALL SO2 REMOVAL EFFICIENCY WILL BE 75%. THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP, AND THE SLUDGE WILL BE PONDED. START UP IS EXPECTED IN SEPTEMBER, 1980.
TEXAS POWER & LIGHT TWIN OAKS 1 NEW 750.0 MW (GROSS) 750.0 MW (ESC) COAL .70 %S LIGNITE LIMESTONE CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 8/84	TWIN OAKS 1 IS A 0.70% SULFUR LIGNITE FIRED BOILER PLANNED BY TEXAS POWER AND LIGHT AND ALCOA FOR LOCATION IN BREMOND, TEXAS. A CONTRACT HAS BEEN AWARDED TO CHEMICO FOR A LIMESTONE FGD SYSTEM ON THIS UNIT. START UP IS EXPECTED IN AUGUST OF 1984.
TEXAS POWER & LIGHT TWIN OAKS 2 NEW 750.0 MW (GROSS) 750.0 MW (ESC) COAL .70 %S LIGNITE LIMESTONE CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 8/85	TWIN OAKS 2 IS A 0.70% SULFUR LIGNITE FIRED BOILER PLANNED BY TEXAS POWER AND LIGHT AND ALCOA FOR LOCATION IN BREMOND, TEXAS. A CONTRACT HAS BEEN AWARDED TO CHEMICO FOR A LIMESTONE FGD SYSTEM ON THIS UNIT. START UP IS EXPECTED IN AUGUST OF 1985.

UNIT IDENTIFICATION	ABSTRACT
TEXAS UTILITIES FOREST GROVE 1 NEW 750.0 MW (GROSS) 750.0 MW (ESC) COAL .80 %S LIGNITE PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 0/81	TEXAS UTILITIES IS PLANNING A LIGNITE (0.8% S, 7000 BTU/LB) FIRED BOILER, FOREST GROVE 1, WHICH WILL BE LOCATED IN ATHENS, TEXAS. THE UTILITY IS PRESENTLY REQUESTING BIDS ON AN FGD SYSTEM FOR THIS UNIT. TWO ESP'S WILL PROVIDE PRIMARY PARTICULATE CONTROL, AND NO STACK GAS REHEAT IS PLANNED. START UP IS EXPECTED IN LATE 1981.
TEXAS UTILITIES MARTIN LAKE 1 NEW 793.0 MW (GROSS) 595.0 MW (ESC) COAL .90 %S LIGNITE LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 1.3% STATUS 1 STARTUP 4/77	TEXAS UTILITIES' MARTIN LAKE 1 IS A LIGNITE (0.9% S, 7380 BTU/LB) FIRED BOILER IN TATUM, TEXAS. THIS UNIT IS EQUIPPED WITH AN EMISSION CONTROL SYSTEM WHICH INCLUDES A COLD SIDE ESP AND A LIMESTONE FGD SYSTEM, BOTH SUPPLIED BY RESEARCH COTTRELL. THE FGD SYSTEM CONSISTS OF SIX PACKED SPRAY TOWER ABSORBERS WHICH TREAT 75% OF THE TOTAL BOILER FLUE GAS. THE REMAINING FLUE GAS IS BYPASSED FOR REHEAT. THE TOTAL DESIGN SO2 REMOVAL EFFICIENCY IS 70.5%. TWO CHEVRONS/MODULE PROVIDE MIST ELIMINATION. THE FLUE GAS CLEANING WASTES ARE FLYASH STABILIZED AND DISPOSED IN AN ON-SITE LANDFILL. THE SYSTEM OPERATES IN A CLOSED WATER LOOP. INITIAL SYSTEM OPERATIONS TOOK PLACE IN APRIL, 1977.
TEXAS UTILITIES MARTIN LAKE 2 NEW 793.0 MW (GROSS) 595.0 MW (ESC) COAL .90 %S LIGNITE LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 1.3% STATUS 1 STARTUP 5/78	TEXAS UTILITIES' MARTIN LAKE 2 IS A LIGNITE (0.9% S, 7380 BTU/LB) FIRED BOILER IN TATUM, TEXAS. THIS UNIT IS EQUIPPED WITH AN EMISSION CONTROL SYSTEM WHICH INCLUDES A COLD SIDE ESP AND A LIMESTONE FGD SYSTEM, BOTH SUPPLIED BY RESEARCH COTTRELL. THE FGD SYSTEM CONSISTS OF SIX PACKED SPRAY TOWER ABSORBERS WHICH TREAT 75% OF THE TOTAL BOILER FLUE GAS. THE REMAINING FLUE GAS IS BYPASSED FOR REHEAT. THE TOTAL DESIGN SO2 REMOVAL EFFICIENCY IS 70.5%. TWO CHEVRONS/MODULE PROVIDE MIST ELIMINATION. THE FLUE GAS CLEANING WASTES ARE FLYASH STABILIZED AND DISPOSED IN AN ON-SITE LANDFILL. THE SYSTEM OPERATES IN A CLOSED WATER LOOP. INITIAL SYSTEM OPERATIONS TOOK PLACE IN MAY, 1978.
TEXAS UTILITIES MARTIN LAKE 3 NEW 793.0 MW (GROSS) 595.0 MW (ESC) COAL .90 %S LIGNITE LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 1.3% STATUS 1 STARTUP 2/79	TEXAS UTILITIES' MARTIN LAKE 3 IS A LIGNITE (0.9% S, 7380 BTU/LB) FIRED BOILER IN TATUM, TEXAS. THIS UNIT IS EQUIPPED WITH AN EMISSION CONTROL SYSTEM WHICH INCLUDES A COLD SIDE ESP AND A LIMESTONE FGD SYSTEM, BOTH SUPPLIED BY RESEARCH COTTRELL. THE FGD SYSTEM CONSISTS OF SIX PACKED SPRAY TOWER ABSORBERS WHICH TREAT 75% OF THE TOTAL BOILER FLUE GAS. THE REMAINING FLUE GAS IS BYPASSED FOR REHEAT. THE TOTAL DESIGN SO2 REMOVAL EFFICIENCY IS 70.5%. TWO CHEVRONS/MODULE PROVIDE MIST ELIMINATION. THE FLUE GAS CLEANING WASTES ARE FLYASH STABILIZED AND DISPOSED IN AN ON-SITE LANDFILL. THE SYSTEM OPERATES IN A CLOSED WATER LOOP. INITIAL SYSTEM OPERATIONS TOOK PLACE IN FEBRUARY, 1979.
TEXAS UTILITIES MARTIN LAKE 4 NEW 750.0 MW (GROSS) 750.0 MW (ESC) COAL .90 %S LIGNITE LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 0/85	MARTIN LAKE 4 OF TEXAS UTILITIES IS A LIGNITE (0.9% S, 7380 BTU/LB) FIRED BOILER UNDER CONSTRUCTION IN TATUM, TEXAS. A CONTRACT FOR A LIMESTONE FGD SYSTEM FOR THIS UNIT HAS BEEN AWARDED TO RESEARCH COTTRELL. CONSTRUCTION HAS NOT YET BEGUN ON THE FGD SYSTEM. FGD START UP IS EXPECTED IN 1985 OR 1986.
TEXAS UTILITIES MILL CREEK 1 NEW 750.0 MW (GROSS) 750.0 MW (ESC) COAL ***** %S LIGNITE PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/85	MILL CREEK 1 OF TEXAS UTILITIES IS A PLANNED LIGNITE FIRED UNIT TO BE LOCATED IN HENDERSON, TEXAS. THE UTILITY WILL INCLUDE AN FGD SYSTEM ON THIS UNIT, BUT NO DECISIONS HAVE BEEN MADE AS TO THE PROCESS TYPE OR VENDOR. ESP'S WILL PROVIDE PRIMARY PARTICLE CONTROL. START UP IS EXPECTED IN 1985.

UNIT IDENTIFICATION	ABSTRACT
TEXAS UTILITIES MILL CREEK 2 NEW 750.0 MW (GROSS) 750.0 MW (ESC) COAL ***** %S LIGNITE PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 9/86	MILL CREEK 2 OF TEXAS UTILITIES IS A PLANNED LIGNITE FIRED UNIT TO BE LOCATED IN HENDERSON, TEXAS. THE UTILITY WILL INCLUDE AN FGD SYSTEM ON THIS UNIT, BUT NO DECISIONS HAVE BEEN MADE AS TO THE PROCESS TYPE OR VENDOR. ESP'S WILL PROVIDE PRIMARY PARTICLE CONTROL. START UP IS EXPECTED IN 1986.
TEXAS UTILITIES MONTICELLO 3 NEW 800.0 MW (GROSS) 800.0 MW (ESC) COAL 1.50 %S LIGNITE LIMESTONE CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 5/78	MONTICELLO 3 OF TEXAS UTILITIES IS A LIGNITE (1.5% S, 7000 BTU/LB) FIRED UNIT IN MT. PLEASANT, TEXAS. THIS UNIT'S EMISSION CONTROL SYSTEM CONSISTS OF TWO COLD SIDE ESP'S FOLLOWED BY THREE CHEMICO LIMESTONE SPRAY TOWERS (74% DESIGN SO2 REMOVAL EFFICIENCY), ONE HORIZONTAL CHEVRON MIST ELIMINATOR/MODULE, AND AN INDIRECT HOT AIR REHEATER. THE WATER LOOP IS CLOSED, AND THE FLYASH STABILIZED SLUDGE IS DISPOSED IN AN ON SITE LANDFILL. THIS SYSTEM HAS BEEN OPERATIONAL SINCE MAY OF 1978.
TUCSON ELECTRIC POWER SPRINGERVILLE 1 NEW 370.0 MW (GROSS) 370.0 MW (ESC) COAL .61 %S SUBBITUMINOUS LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 1/85	TUCSON ELECTRIC POWER WILL BE BUILDING TWO NEW UNITS IN SPRINGERVILLE, ARIZONA, SPRINGERVILLE 1 AND 2. THE UNITS WILL FIRE PULVERIZED SUBBITUMINOUS COAL (0.53-0.69% S AND 8500-8900 BTU/LB). A CONTRACT HAS BEEN AWARDED TO JOY MANUFACTURING/NIRO ATOMIZER FOR A LIME/SPRAY DRYING FGD SYSTEM TO CONTROL PARTICULATE MATTER AND SO2 EMISSIONS. THE SYSTEM WILL BE DESIGNED TO ACCOMODATE A REHEATER (SHOULD ONE BE REQUIRED) AND WILL OPERATE IN A CLOSED WATER LOOP. CLEANED FLUE GAS WILL EXIT THE SYSTEM VIA A 500 FOOT CONCRETE STACK. OPERATIONS ARE SCHEDULED TO BEGIN IN 1985.
TUCSON ELECTRIC POWER SPRINGERVILLE 2 NEW 370.0 MW (GROSS) 370.0 MW (ESC) COAL .61 %S SUBBITUMINOUS LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 10/86	TUCSON GAS AND ELECTRIC WILL BE BUILDING TWO NEW UNITS IN SPRINGERVILLE, ARIZONA, SPRINGERVILLE 1 AND 2. THE UNITS WILL FIRE PULVERIZED SUBBITUMINOUS COAL (0.53-0.69% S AND 8500-8900 BTU/LB). A CONTRACT HAS BEEN AWARDED TO JOY MANUFACTURING/NIRO ATOMIZER FOR A LIME/SPRAY DRYING FGD SYSTEM TO CONTROL PARTICULATE MATTER AND SO2 EMISSIONS. THE SYSTEM WILL BE DESIGNED TO ACCOMODATE A REHEATER (SHOULD ONE BE REQUIRED) AND WILL OPERATE IN A CLOSED WATER LOOP. CLEANED FLUE GAS WILL EXIT THE SYSTEM VIA A 500 FOOT CONCRETE STACK. OPERATIONS ARE SCHEDULED TO BEGIN IN 1986.
UNITED POWER ASSOCIATION STANTON 1A NEW 50.0 MW (GROSS) 50.0 MW (ESC) COAL .77 %S LIGNITE LIME/SPRAY DRYING RESEARCH-COTTRELL ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 1/82	THE UNITED POWER ASSOCIATION HAS PLANS FOR A PULVERIZED COAL (0.77% S, 7000 BTU/LB) FIRED UNIT, STANTON 1A, TO BE LOCATED IN STANTON, NORTH DAKOTA. A CONTRACT HAS BEEN AWARDED TO KOMLINE AND SANDERSON FOR A LIME SPRAY DRYER. A FABRIC FILTER SUPPLIED BY RESEARCH COTTRELL WILL BE DESIGNED TO REMOVE 99% OF THE PARTICULATE. THE SYSTEM WILL OPERATE IN AN OPEN LOOP MODE WITH SLUDGE DISPOSAL TO BE IN A CLAY LINED SETTLING POND. OPERATIONS ARE SCHEDULED TO COMMENCE IN JANUARY, 1982.
UTAH POWER & LIGHT HUNTER 1 NEW 400.0 MW (GROSS) 360.0 MW (ESC) COAL .55 %S BITUMINOUS LIME CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 5/79	HUNTER 1 OF UTAH POWER AND LIGHT IS A COAL (0.55% S, 12,500 BTU/LB) FIRED UNIT IN CASTLEDALE, UTAH. CHEMICO SUPPLIED A PEBBLE LIME WET SCRUBBING SYSTEM WHICH BECAME OPERATIONAL IN MAY, 1979. THE SCRUBBING SYSTEM IS DESIGNED TO OPERATE IN AN OPEN WATER LOOP WITH AN SO2 REMOVAL EFFICIENCY OF 80%. PRIMARY PARTICULATE CONTROL IS PROVIDED BY AN UPSTREAM ESP, AND STACK GAS REHEAT IS PROVIDED BY BYPASS. THE SLUDGE IS FLYASH STABILIZED AND DISPOSED ON-SITE.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
UTAH POWER & LIGHT HUNTER 2 NEW 400.0 MW (GROSS) 360.0 MW (ESC) COAL .55 %S LIME CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 6/80	UTAH POWER AND LIGHT'S HUNTER 2 IS A COAL (0.55% S, 12,500 BTU/LB) FIRED UNIT LOCATED IN CASTLEDALE, UTAH. FOR EMISSION CONTROL, CHEMICO SUPPLIED A PEBBLE LIME WET SCRUBBING SYSTEM DESIGNED TO OPERATE IN AN OPEN WATER LOOP WITH AN SO2 REMOVAL EFFICIENCY OF 80%. AN UPSTREAM ESP PROVIDES PRIMARY PARTICLE CONTROL, AND A BYPASS SYSTEM PROVIDES STACK GAS REHEAT. THE SLUDGE IS FLYASH STABILIZED AND DISPOSED OF ON-SITE. START UP OF BOTH THE BOILER AND FGD SYSTEM TOOK PLACE IN JUNE, 1980.
UTAH POWER & LIGHT HUNTER 3 NEW 400.0 MW (GROSS) 400.0 MW (ESC) COAL .55 %S BITUMINOUS LIMESTONE CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 0/83	UTAH POWER AND LIGHT HAS PLANS FOR TWO NEW UNITS, HUNTER 3 AND 4, TO BE CONSTRUCTED IN CASTLEDALE, UTAH. A CONTRACT HAS BEEN AWARDED TO CHEMICO FOR A LIME, NONREGENERABLE FGD UNIT FOR EMISSION CONTROL. THE PULVERIZED COAL FIRED UNITS (0.55% S, 12,500 BTU/LB) ARE TO BEGIN OPERATIONS IN 1983 AND 1985, RESPECTIVELY.
UTAH POWER & LIGHT HUNTER 4 NEW 400.0 MW (GROSS) 400.0 MW (ESC) COAL .55 %S BITUMINOUS LIMESTONE CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 0/85	UTAH POWER AND LIGHT HAS PLANS FOR TWO NEW UNITS, HUNTER 3 AND 4, TO BE CONSTRUCTED IN CASTLEDALE, UTAH. A CONTRACT HAS BEEN AWARDED TO CHEMICO FOR A LIME, NONREGENERABLE FGD UNIT FOR EMISSION CONTROL. THE PULVERIZED COAL FIRED UNITS (0.55% S, 12,500 BTU/LB) ARE TO BEGIN OPERATIONS IN 1983 AND 1985, RESPECTIVELY.
UTAH POWER & LIGHT HUNTINGTON 1 NEW 430.0 MW (GROSS) 366.0 MW (ESC) COAL .55 %S BITUMINOUS LIME CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: 1.6% STATUS 1 STARTUP 5/78	HUNTINGTON 1 OF UTAH POWER IS A TANGENTIALLY FIRED PULVERIZED COAL (0.55% S, 12,500 BTU/LB) BOILER IN PRICE, UTAH. A COLD SIDE ESP TREATS 1,742,000 ACFM OF FLUE GAS AND IS FOLLOWED BY A CHEMICO LIME FGD SYSTEM CONSISTING OF FOUR SPRAY TOWERS (80% DESIGN EFFICIENCY). ONE FOUR PASS CHEVRON/MODULE PROVIDES MIST ELIMINATION, AND A COMBINATION OF A STEAM TUBE AND 10-20% BYPASS REHEATERS BOOST THE GAS TEMPERATURE 45-50 DEG F. THE SYSTEM OPERATES IN A CLOSED WATER LOOP, AND THE FLYASH STABILIZED SLUDGE IS TRUCKED TO AN ON-SITE LANDFILL. THE SYSTEM INCLUDES A 600 FOOT ACID BRICK LINED STACK, AND HAS BEEN OPERATIONAL SINCE MAY OF 1978.
WEST PENN POWER MITCHELL 33 RETROFIT 300.0 MW (GROSS) 300.0 MW (ESC) COAL 2.80 %S BITUMINOUS LIME CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: 1.1% STATUS 3 STARTUP 8/82	UNIT 33 AT ALLEGHENY POWER SYSTEM'S MITCHELL POWER STATION IN COURTNEY, PENNSYLVANIA IS A 2.8% SULFUR COAL FIRED BOILER. A CONTRACT WAS AWARDED TO CHEMICO FOR A LIME SCRUBBING PROCESS. SO2 REMOVAL EFFICIENCY WILL BE 95%. START UP IS PLANNED FOR AUGUST OF 1982.
WEST TEXAS UTILITIES OKLAUNION 1 NEW 720.0 MW (GROSS) 720.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 7 STARTUP 0/87	WEST TEXAS UTILITIES HAS PLANS FOR A PULVERIZED COAL FIRED BOILER TO BE LOCATED NEAR OKLAUNION, TEXAS. THE UTILITY IS CONSIDERING FGD ALONG WITH ALTERNATIVE METHODS FOR EMISSION CONTROL FROM THE 720 MW UNIT. THE OKLAUNION 1 PLANT IS SCHEDULED TO COMMENCE OPERATIONS IN 1987.

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                                          SECTION 3
                       DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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 COMPANY NAME                                       ALABAMA ELECTRIC COOP
 PLANT NAME                                         TOMBIGBEE
 UNIT NUMBER                                        2
 CITY                                               LEROY
 STATE                                              ALABAMA
 GROSS UNIT GENERATING CAPACITY - MW                  255.0
 NET UNIT GENERATING CAPACITY W/FGD - MW              235.0
 EQUIVALENT SCRUBBED CAPACITY - MW                    179.0

 ** FUEL DATA
      FUEL TYPE                                     COAL
      FUEL GRADE                                    BITUMINOUS
      AVERAGE HEAT CONTENT - J/G                     26749.          ( 11500 BTU/LB)
      AVERAGE ASH CONTENT - %                           14.00
      AVERAGE MOISTURE CONTENT - %                       7.00
      AVERAGE SULFUR CONTENT - %                         1.15
      AVERAGE CHLORIDE CONTENT - %                        .04

 ** GENERAL EMISSION CONTROL SYSTEM DATA
      GENERAL PROCESS TYPE                          WET SCRUBBING
      PROCESS TYPE                                  LIMESTONE
      SYSTEM SUPPLIER                               PEABODY PROCESS SYSTEMS
      NEW/RETROFIT                                  NEW
      ENERGY CONSUMPTION - %                             3.1
      INITIAL START-UP DATE                          9/78
      COMMERCIAL START-UP DATE                       9/78
      SO2 DESIGN REMOVAL EFFICIENCY - %                59.50
      PARTICULATE DESIGN REMOVAL EFFICIENCY - %        99.30
      ABSORBER SPARE CAPACITY INDEX - %               100.0
      ABSORBER SPARE COMPONENTS INDEX                    1.0

 ** WATER LOOP
      TYPE                                          CLOSED
      FRESH MAKE-UP WATER - LITER/S                     8.8          (  140 GPM)

 ** DISPOSAL
      TYPE                                          LINED POND


----------------------------------------PERFORMANCE DATA---------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80   A                      35.8                    21.1
        B                      56.7                    33.5
        SYSTEM       90.7      81.5                    48.1                   744    439    357

        ** PROBLEMS/SOLUTIONS/COMMENTS

                          DURING JANUARY UNIT 2 WAS UNAVAILABLE 69 HOURS DUE TO REPAIRS NEEDED ON
                          AN ABRADED EXPANSION JOINT AND A RUPTURED WASTE SLURRY LINE.

 2/80   A                      84.3                    84.3
        B                      74.7                    74.7
        SYSTEM       99.3      99.3                    99.3                   696    696    691

        ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE UNIT 2 FGD SYSTEM OPERATED ALL BUT 5 HOURS DURING FEBRUARY, IN WHICH
                          TIME THE BOILER WAS BEING BROUGHT ON-LINE.

 3/80   A                      81.6                    75.0
        B                      79.4                    73.0
        SYSTEM      100.0      97.8                    89.9                   744    684    669
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ALABAMA ELECTRIC COOP: TOMBIGBEE 2 (CONT.)

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-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         DURING MARCH THE FGD SYSTEM WAS AVAILABLE 100% OF THE TIME.

 4/80  A                      61.3                     61.3
       B                      86.6                     86.5
       SYSTEM      100.0      97.5                     97.4                    720   719     701

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE UTILITY REPORTED THAT FOR THE MONTH OF APRIL THE SYSTEM WAS
                         AVAILABLE 100% OF THE TIME.

 5/80  A                      34.9                     34.7
       B                      92.8                     92.2
       SYSTEM      100.0      97.3        97.3         96.6                    744   739     719

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE FGD SYSTEM WAS AVAILABLE 100% DURING MAY.

 6/80  SYSTEM                                                                  720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         INFORMATION WAS NOT AVAILABLE FOR THE MONTH OF JUNE.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	ALABAMA ELECTRIC COOP	
PLANT NAME	TOMBIGBEE	
UNIT NUMBER	3	
CITY	LEROY	
STATE	ALABAMA	
GROSS UNIT GENERATING CAPACITY - MW	255.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	235.0	
EQUIVALENT SCRUBBED CAPACITY - MW	179.0	
**** FUEL DATA**		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26749.	(11500 BTU/LB)
AVERAGE ASH CONTENT - %	14.00	
AVERAGE MOISTURE CONTENT - %	7.00	
AVERAGE SULFUR CONTENT - %	1.15	
AVERAGE CHLORIDE CONTENT - %	.04	
**** GENERAL EMISSION CONTROL SYSTEM DATA**		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	PEABODY PROCESS SYSTEMS	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	3.1	
INITIAL START-UP DATE	6/79	
COMMERCIAL START-UP DATE	6/79	
SO2 DESIGN REMOVAL EFFICIENCY - %	59.50	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.30	
ABSORBER SPARE CAPACITY INDEX - %	100.0	
ABSORBER SPARE COMPONENTS INDEX	1.0	
**** WATER LOOP**		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	8.8	(140 GPM)
**** DISPOSAL**		
TYPE	LINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	A		69.2		30.5						
	B		45.4		20.0						
	SYSTEM	100.0	97.9		43.1			744	328	321	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY UNIT 3 WAS AVAILABLE THE ENTIRE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	A		33.3		1.1						
	B		100.0		3.4						
	SYSTEM	100.0	100.0		3.4			696	24	24	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY THE UNIT 3 BOILER AND FGD SYSTEM OPERATED ONLY 24 HOURS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	A				.0						
	B				.0						
	SYSTEM	100.0			.0			744	0	0	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH THE UNIT 3 GENERATOR WAS KEPT OUT OF SERVICE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM				.0			720	0	0	

ALABAMA ELECTRIC COOP: TOMBIGBEE 3 (CONT.)

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-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD    CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       THE UTILITY REPORTED THAT DURING APRIL THE BOILER DID NOT OPERATE.

5/80   A                     8.3                        .7
       B                      .0                        .0
       SYSTEM      95.8      8.3         8.3            .7                    744    60     5

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       THE FGD SYSTEM WAS AVAILABLE 713 HOURS DURING MAY; HOWEVER, THE BOILER ONLY
                       OPERATED 60 HOURS DUE TO BOILER RELATED PROBLEMS.

                       THE B MODULE WAS OUT FOR 31 HOURS WHEN THE INLET DAMPER SWITCH FAILED
                       CAUSING THE DRIVE MOTOR TO BURN OUT.

6/80   SYSTEM                                                                 720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       INFORMATION WAS NOT AVAILABLE FOR THE MONTH OF JUNE.
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COMPANY NAME                                     ARIZONA ELECTRIC POWER COOP
PLANT NAME                                       APACHE
UNIT NUMBER                                      2
CITY                                             COCHISE
STATE                                            ARIZONA
GROSS UNIT GENERATING CAPACITY - MW                195.0
NET UNIT GENERATING CAPACITY W/FGD - MW            175.0
EQUIVALENT SCRUBBED CAPACITY - MW                   97.5

** FUEL DATA
    FUEL TYPE                                    COAL
    FUEL GRADE                                   BITUMINOUS
    AVERAGE HEAT CONTENT - J/G                    23260.        ( 10000 BTU/LB)
    AVERAGE ASH CONTENT - %                          15.00
    AVERAGE MOISTURE CONTENT - %                      9.00
    AVERAGE SULFUR CONTENT - %                         .55
    AVERAGE CHLORIDE CONTENT - %                 ********

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                         WET SCRUBBING
    PROCESS TYPE                                 LIMESTONE
    SYSTEM SUPPLIER                              RESEARCH-COTTRELL
    NEW/RETROFIT                                 NEW
    ENERGY CONSUMPTION - %                           4.1
    INITIAL START-UP DATE                         8/78
    COMMERCIAL START-UP DATE                      1/79
    SO2 DESIGN REMOVAL EFFICIENCY - %               85.00
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %       99.50
    ABSORBER SPARE CAPACITY INDEX - %              100.0
    ABSORBER SPARE COMPONENTS INDEX                  1.0

** WATER LOOP
    TYPE                                         OPEN
    FRESH MAKE-UP WATER - LITER/S                  115.9        ( 1840 GPM)

** DISPOSAL
    TYPE                                         POND


-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  SYSTEM      90.9         58.3        88.8        57.3    97.40            744    731    426

      ** PROBLEMS/SOLUTIONS/COMMENTS

                     DURING JANUARY SOME OUTAGE TIME WAS DUE TO A PUMP MALFUNCTION.

                     OUTAGE TIME WAS ALSO CAUSED BY A BROKEN FEED BELT TO THE LIMESTONE BALL
                     MILL.

 2/80  SYSTEM      92.8         96.7        92.8        92.8    97.40            696    668    646

      ** PROBLEMS/SOLUTIONS/COMMENTS

                     DURING FEBRUARY OUTAGE TIME WAS DUE TO A PRECIPITATOR FAILURE.

                     FORCED OUTAGE TIME WAS ALSO CAUSED BY A PUMP MALFUNCTION.

 3/80  SYSTEM      99.0         99.0        99.0        99.0                     744    744    738

      ** PROBLEMS/SOLUTIONS/COMMENTS

                     SOME OF THE OUTAGE TIME DURING MARCH OCCURRED BECAUSE OF PUMP FAILURE.

                     OTHER OUTAGE TIME WAS CAUSED BY STICKING VALVES AND LIMESTONE FEED-BELT
                     PROBLEMS.
```

ARIZONA ELECTRIC POWER COOP: APACHE 2 (CONT.)

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------------------------------------------PERFORMANCE DATA--------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD    CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------

 4/80  SYSTEM      67.2         65.2        65.2        61.4                720    678    442

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         DURING APRIL THE FGD SYSTEM WAS FORCED DOWN DUE TO PUMP FAILURES AND A
                         RUPTURE IN THE SLURRY RECIRCULATION LINE.

 5/80  SYSTEM      90.5         90.5        90.5        90.5                744    744    673

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         DURING MAY THE UNIT WAS FORCED OFF LINE WHEN THE LIMESTONE CRUSHER
                         MALFUNCTIONED.

                         THE UNIT WAS ALSO FORCED OUT DUE TO PUMP AND VALVE FAILURES.

 6/80  SYSTEM                                                               720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         INFORMATION WAS NOT AVAILABLE FOR THE MONTH OF JUNE.
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                                                SECTION 3
                        DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
------------------------------------------------------------------------------------------------------------------

COMPANY NAME                                      ARIZONA ELECTRIC POWER COOP
PLANT NAME                                        APACHE
UNIT NUMBER                                       3
CITY                                              COCHISE
STATE                                             ARIZONA
GROSS UNIT GENERATING CAPACITY - MW                 195.0
NET UNIT GENERATING CAPACITY W/FGD - MW             175.0
EQUIVALENT SCRUBBED CAPACITY - MW                    97.5

** FUEL DATA
    FUEL TYPE                                     COAL
    FUEL GRADE                                    BITUMINOUS
    AVERAGE HEAT CONTENT - J/G                     23260.          ( 10000 BTU/LB)
    AVERAGE ASH CONTENT - %                          15.00
    AVERAGE MOISTURE CONTENT - %                      9.00
    AVERAGE SULFUR CONTENT - %                         .55
    AVERAGE CHLORIDE CONTENT - %                  ********

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                          WET SCRUBBING
    PROCESS TYPE                                  LIMESTONE
    SYSTEM SUPPLIER                               RESEARCH-COTTRELL
    NEW/RETROFIT                                  NEW
    ENERGY CONSUMPTION - %                            4.1
    INITIAL START-UP DATE                          6/79
    COMMERCIAL START-UP DATE                       4/79
    SO2 DESIGN REMOVAL EFFICIENCY - %                85.00
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %        99.50
    ABSORBER SPARE CAPACITY INDEX - %               100.0
    ABSORBER SPARE COMPONENTS INDEX                   1.0

** WATER LOOP
    TYPE                                          OPEN
    FRESH MAKE-UP WATER - LITER/S                   340.2          ( 5400 GPM)

** DISPOSAL
    TYPE                                          POND


-----------------------------------------PERFORMANCE DATA-----------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  SYSTEM     91.7         91.7        91.7        91.7    97.40         744   744   682

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          DURING JANUARY SOME OUTAGE TIME WAS DUE TO A PUMP MALFUNCTION.

                          OUTAGE TIME WAS ALSO CAUSED BY A BROKEN FEED BELT TO THE LIMESTONE BALL
                          MILL.

 2/80  SYSTEM     95.6         74.1        96.0        71.4    97.40         696   671   497

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          DURING FEBRUARY OUTAGE TIME WAS DUE TO A PRECIPITATOR FAILURE.

                          FORCED OUTAGE TIME WAS ALSO CAUSED BY A PUMP MALFUNCTION.

 3/80  SYSTEM     91.0         91.0        91.0        91.0                  744   744   677

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          SOME OF THE OUTAGE TIME DURING MARCH OCCURRED BECAUSE OF PUMP FAILURE.

                          OTHER OUTAGE TIME WAS CAUSED BY STICKING VALVES AND LIMESTONE FEED-BELT
                          PROBLEMS.
```

ARIZONA ELECTRIC POWER COOP: APACHE 3 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR
4/80	SYSTEM	99.0	96.9	96.9	30.6			720	227	220	
	** PROBLEMS/SOLUTIONS/COMMENTS										
			DURING APRIL THE FGD SYSTEM WAS FORCED DOWN DUE TO PUMP FAILURES AND A RUPTURE IN THE SLURRY RECIRCULATION LINE.								
5/80	SYSTEM	.0	.0		.0			744	39	0	
	** PROBLEMS/SOLUTIONS/COMMENTS										
			THE UNIT WAS NOT AVAILABLE DURING MAY DUE TO A SCHEDULED FGD UNIT OUTAGE.								
6/80	SYSTEM							720			
	** PROBLEMS/SOLUTIONS/COMMENTS										
			INFORMATION WAS NOT AVAILABLE FOR THE MONTH OF JUNE.								

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	ARIZONA PUBLIC SERVICE	
PLANT NAME	CHOLLA	
UNIT NUMBER	1	
CITY	JOSEPH CITY	
STATE	ARIZONA	
GROSS UNIT GENERATING CAPACITY - MW	119.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	115.0	
EQUIVALENT SCRUBBED CAPACITY - MW	119.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	23609.	(10150 BTU/LB)
AVERAGE ASH CONTENT - %	13.50	
AVERAGE MOISTURE CONTENT - %	15.00	
AVERAGE SULFUR CONTENT - %	.50	
AVERAGE CHLORIDE CONTENT - %	.02	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	RESEARCH-COTTRELL	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	3.4	
INITIAL START-UP DATE	10/73	
COMMERCIAL START-UP DATE	12/73	
SO2 DESIGN REMOVAL EFFICIENCY - %	58.50	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	80.00	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	7.6	(120 GPM)
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
11/79	A		77.0		77.0						
	B		98.0		98.0						
	SYSTEM		87.5		87.5			720	720	632	
12/79	A		94.0		94.0						
	B		87.0		87.0						
	SYSTEM		90.5		90.5			744	744	672	
1/80	A		95.0		95.0						
	B		99.0		99.0						
	SYSTEM		97.0		97.0			744	744	724	
2/80	A		100.0		100.0						
	B		99.0		99.0						
	SYSTEM		99.5		99.5			696	696	694	
3/80	A		99.0		99.0						
	B		93.0		93.0						
	SYSTEM		96.0		96.0			744	744	715	

** PROBLEMS/SOLUTIONS/COMMENTS

NO FORCED OUTAGES WERE REPORTED BY THE UTILITY FOR THE FIVE MONTH PERIOD. SOME SCHEDULED OUTAGE TIME WAS REQUIRED FOR REPAIR OF THE REHEATER DUCTWORK.

ARIZONA PUBLIC SERVICE: CHOLLA 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION FOR THE APRIL THROUGH JUNE PERIOD WAS NOT AVAILABLE.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	ARIZONA PUBLIC SERVICE	
PLANT NAME	CHOLLA	
UNIT NUMBER	2	
CITY	JOSEPH CITY	
STATE	ARIZONA	
GROSS UNIT GENERATING CAPACITY - MW	264.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	235.0	
EQUIVALENT SCRUBBED CAPACITY - MW	264.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	23609.	(10150 BTU/LB)
AVERAGE ASH CONTENT - %	13.50	
AVERAGE MOISTURE CONTENT - %	15.00	
AVERAGE SULFUR CONTENT - %	.50	
AVERAGE CHLORIDE CONTENT - %	.02	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	RESEARCH-COTTRELL	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	4/78	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	75.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.70	
ABSORBER SPARE CAPACITY INDEX - %	33.0	
ABSORBER SPARE COMPONENTS INDEX	1.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	7.6	(120 GPM)
** DISPOSAL		
TYPE	UNLINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION IS AVAILABLE AS OF YET WITH RESPECT TO THE CHOLLA 2 FGD OPERATIONS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM PERFORMANCE DATA FOR THE APRIL-JUNE PERIOD IS NOT AVAILABLE AT THIS TIME.

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                                     SECTION 3
                 DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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COMPANY NAME                                    ARIZONA PUBLIC SERVICE
PLANT NAME                                      FOUR CORNERS
UNIT NUMBER                                     1
CITY                                            FARMINGTON
STATE                                           NEW MEXICO
GROSS UNIT GENERATING CAPACITY - MW               175.0
NET UNIT GENERATING CAPACITY W/FGD - MW           175.0
EQUIVALENT SCRUBBED CAPACITY - MW                 175.0

** FUEL DATA
    FUEL TYPE                                   COAL
    FUEL GRADE                                  SUBBITUMINOUS
    AVERAGE HEAT CONTENT - J/G                   20004.        (  8600 BTU/LB)
    AVERAGE ASH CONTENT - %                         22.00
    AVERAGE MOISTURE CONTENT - %                    12.30
    AVERAGE SULFUR CONTENT - %                        .75
    AVERAGE CHLORIDE CONTENT - %                      .07

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                        WET SCRUBBING
    PROCESS TYPE                                LIME/ALKALINE FLYASH
    SYSTEM SUPPLIER                             CHEMICO DIVISION, ENVIROTECH
    NEW/RETROFIT                                RETROFIT
    ENERGY CONSUMPTION - %                      *******
    INITIAL START-UP DATE                       11/79
    COMMERCIAL START-UP DATE                    **/**
    SO2 DESIGN REMOVAL EFFICIENCY - %           ********
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %      99.00
    ABSORBER SPARE CAPACITY INDEX - %                 .0
    ABSORBER SPARE COMPONENTS INDEX                   .0


------------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL  PER  BOILER  FGD   CAP.
                                                               SO2 PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

11/79  SYSTEM                                                             720

12/79  SYSTEM                                                             744

        ** PROBLEMS/SOLUTIONS/COMMENTS

                      INITIAL OPERATIONS STARTED IN NOVEMBER 1979.

 1/80  SYSTEM                                                             744

 2/80  SYSTEM                                                             696

 3/80  SYSTEM                                                             744

        ** PROBLEMS/SOLUTIONS/COMMENTS

                      THE UNIT IS PRESENTLY IN THE SHAKEDOWN/DEBUGGING PHASE OF OPERATION.

 4/80  SYSTEM                                                             720

 5/80  SYSTEM                                                             744

 6/80  SYSTEM                                                             720

        ** PROBLEMS/SOLUTIONS/COMMENTS

                      ALTHOUGH THE FGD SYSTEM PERFORMANCE DATA IS BEING LOGGED, THE UTILITY
                      REPORTED THAT IT IS UNAVAILABLE FOR RELEASE AT THIS TIME.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

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COMPANY NAME                                         ARIZONA PUBLIC SERVICE
PLANT NAME                                           FOUR CORNERS
UNIT NUMBER                                          2
CITY                                                 FARMINGTON
STATE                                                NEW MEXICO
GROSS UNIT GENERATING CAPACITY - MW                    175.0
NET UNIT GENERATING CAPACITY W/FGD - MW                175.0
EQUIVALENT SCRUBBED CAPACITY - MW                      175.0

** FUEL DATA
    FUEL TYPE                                        COAL
    FUEL GRADE                                       SUBBITUMINOUS
    AVERAGE HEAT CONTENT - J/G                        20004.         (  8600 BTU/LB)
    AVERAGE ASH CONTENT - %                             22.00
    AVERAGE MOISTURE CONTENT - %                        12.30
    AVERAGE SULFUR CONTENT - %                            .75
    AVERAGE CHLORIDE CONTENT - %                          .07

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                             WET SCRUBBING
    PROCESS TYPE                                     LIME/ALKALINE FLYASH
    SYSTEM SUPPLIER                                  CHEMICO DIVISION, ENVIROTECH
    NEW/RETROFIT                                     RETROFIT
    ENERGY CONSUMPTION - %                           *******
    INITIAL START-UP DATE                            11/79
    COMMERCIAL START-UP DATE                         **/**
    SO2 DESIGN REMOVAL EFFICIENCY - %                ********
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %           99.00
    ABSORBER SPARE CAPACITY INDEX - %                     .0
    ABSORBER SPARE COMPONENTS INDEX                       .0


------------------------------------------PERFORMANCE DATA---------------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                               SO2   PART. HOURS  HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

11/79  SYSTEM                                                                720

12/79  SYSTEM                                                                744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          INITIAL OPERATIONS STARTED IN NOVEMBER 1979.

 1/80  SYSTEM                                                                744

 2/80  SYSTEM                                                                696

 3/80  SYSTEM                                                                744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE UNIT IS PRESENTLY IN THE SHAKEDOWN/DEBUGGING PHASE OF OPERATION.

 4/80  SYSTEM                                                                720

 5/80  SYSTEM                                                                744

 6/80  SYSTEM                                                                720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          ALTHOUGH THE FGD SYSTEM PERFORMANCE DATA IS BEING LOGGED, THE UTILITY
                          REPORTED THAT IT IS UNAVAILABLE FOR RELEASE AT THIS TIME.
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                                      SECTION 3
                    DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
-----------------------------------------------------------------------------------------------------

COMPANY NAME                                    ARIZONA PUBLIC SERVICE
PLANT NAME                                      FOUR CORNERS
UNIT NUMBER                                     3
CITY                                            FARMINGTON
STATE                                           NEW MEXICO
GROSS UNIT GENERATING CAPACITY - MW               229.0
NET UNIT GENERATING CAPACITY W/FGD - MW           229.0
EQUIVALENT SCRUBBED CAPACITY - MW                 229.0

** FUEL DATA
    FUEL TYPE                                   COAL
    FUEL GRADE                                  SUBBITUMINOUS
    AVERAGE HEAT CONTENT - J/G                   20004.        (  8600 BTU/LB)
    AVERAGE ASH CONTENT - %                         22.00
    AVERAGE MOISTURE CONTENT - %                    12.30
    AVERAGE SULFUR CONTENT - %                        .75
    AVERAGE CHLORIDE CONTENT - %                      .07

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                        WET SCRUBBING
    PROCESS TYPE                                LIME/ALKALINE FLYASH
    SYSTEM SUPPLIER                             CHEMICO DIVISION, ENVIROTECH
    NEW/RETROFIT                                RETROFIT
    ENERGY CONSUMPTION - %                      *******
    INITIAL START-UP DATE                       11/79
    COMMERCIAL START-UP DATE                    **/**
    SO2 DESIGN REMOVAL EFFICIENCY - %           ********
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %       99.00
    ABSORBER SPARE CAPACITY INDEX - %                 .0
    ABSORBER SPARE COMPONENTS INDEX                   .0


-----------------------------------------PERFORMANCE DATA--------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

11/79  SYSTEM                                                                720

12/79  SYSTEM                                                                744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                   INITIAL OPERATIONS STARTED IN NOVEMBER 1979.

 1/80  SYSTEM                                                                744

 2/80  SYSTEM                                                                696

 3/80  SYSTEM                                                                744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                   THE UNIT IS PRESENTLY IN THE SHAKEDOWN/DEBUGGING PHASE OF OPERATION.

 4/80  SYSTEM                                                                720

 5/80  SYSTEM                                                                744

 6/80  SYSTEM                                                                720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                   ALTHOUGH THE FGD SYSTEM PERFORMANCE DATA IS BEING LOGGED, THE UTILITY
                   REPORTED THAT IT IS UNAVAILABLE FOR RELEASE AT THIS TIME.
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                                        SECTION 3
                DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
------------------------------------------------------------------------------------------------

 COMPANY NAME                                      BIG RIVERS ELECTRIC
 PLANT NAME                                        GREEN
 UNIT NUMBER                                       1
 CITY                                              SEBREE
 STATE                                             KENTUCKY
 GROSS UNIT GENERATING CAPACITY - MW                 242.0
 NET UNIT GENERATING CAPACITY W/FGD - MW             200.0
 EQUIVALENT SCRUBBED CAPACITY - MW                   242.0

 ** FUEL DATA
     FUEL TYPE                                     COAL
     FUEL GRADE                                    BITUMINOUS
     AVERAGE HEAT CONTENT - J/G                     22676.        (  9750 BTU/LB)
     AVERAGE ASH CONTENT - %                          20.00
     AVERAGE MOISTURE CONTENT - %                     11.00
     AVERAGE SULFUR CONTENT - %                        3.75
     AVERAGE CHLORIDE CONTENT - %                  ********

 ** GENERAL EMISSION CONTROL SYSTEM DATA
     GENERAL PROCESS TYPE                          WET SCRUBBING
     PROCESS TYPE                                  LIME
     SYSTEM SUPPLIER                               AMERICAN AIR FILTER
     NEW/RETROFIT                                  NEW
     ENERGY CONSUMPTION - %                        *******
     INITIAL START-UP DATE                         12/79
     COMMERCIAL START-UP DATE                      12/79
     SO2 DESIGN REMOVAL EFFICIENCY - %                90.00
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %        99.00
     ABSORBER SPARE CAPACITY INDEX - %                30.0
     ABSORBER SPARE COMPONENTS INDEX                    .4

 ** WATER LOOP
     TYPE                                          CLOSED
     FRESH MAKE-UP WATER - LITER/S                 *******        (***** GPM)

 ** TREATMENT
     TYPE                                          POZ-O-TEC


----------------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  SYSTEM                                                                744

 2/80  SYSTEM                                                                696

 3/80  SYSTEM                                                                744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                        NO INFORMATION WAS AVAILABLE FOR THE FIRST QUARTER, 1980.

 4/80  A             65.0         56.0        78.8        45.0
       B             65.0         56.0        79.0        45.0
       SYSTEM        65.0         56.0        79.0        45.0                   720    576    324

       ** PROBLEMS/SOLUTIONS/COMMENTS

                        THE FOLLOWING FIVE OUTAGES OCCURRED IN APRIL AND ACCOUNTED FOR THE LOW
                        AVAILABILITY OF THE FGD SYSTEM.
                            1. LOW ADDITIVE IN TANK
                            2. INSTRUMENT TROUBLE
                            3. WATER IN THE PANEL
                            4. LOW ON LIME IN THE HOLDING TANKS
                            5. THE ESPS TRIPPED

 5/80  A             73.7         76.1        79.0        73.7
```

BIG RIVERS ELECTRIC: GREEN 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	B	73.7	76.0	78.9	73.5						
	SYSTEM	73.7	76.1	79.0	73.7			744	720	548	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY THE FGD SYSTEM WAS OFF LINE FOR APPROXIMATELY 548 HOURS DUE TO THE FOLLOWING PROBLEMS.

1. SULFUR OXIDES TOO HIGH
2. LOW LEVEL IN ADDITIVE TANK
3. INSTRUMENT TROUBLE
4. SCHEDULED MAINTENANCE OUTAGE
5. SOLIDS ON CARRY OVER
6. SOLID WASTE PROBLEM
7. UNIT TRIPPED
8. CONSTRUCTION WORK

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS NOT AVAILABLE FOR THE MONTH OF JUNE.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	CENTRAL ILLINOIS LIGHT	
PLANT NAME	DUCK CREEK	
UNIT NUMBER	1	
CITY	CANTON	
STATE	ILLINOIS	
GROSS UNIT GENERATING CAPACITY - MW	416.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	378.0	
EQUIVALENT SCRUBBED CAPACITY - MW	416.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	24423.	(10500 BTU/LB)
AVERAGE ASH CONTENT - %	9.12	
AVERAGE MOISTURE CONTENT - %	18.00	
AVERAGE SULFUR CONTENT - %	3.30	
AVERAGE CHLORIDE CONTENT - %	.03	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	ENVIRONEERING, RILEY STOKER	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	2.9	
INITIAL START-UP DATE	7/76	
COMMERCIAL START-UP DATE	8/78	
SO2 DESIGN REMOVAL EFFICIENCY - %	85.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	********	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	37.8	(600 GPM)
** DISPOSAL		
TYPE	LINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	A	24.8	27.0	29.8	24.8						
	B	58.5	63.6	65.9	58.5						
	C	17.1	18.6	27.3	17.1						
	D	29.2	31.8	35.3	29.3						
	SYSTEM	32.4	35.3	37.8	32.4			744	684	241	81.6

** PROBLEMS/SOLUTIONS/COMMENTS

OUTAGE TIME WAS REQUIRED DURING JANUARY FOR RECYCLE TANK COVERING WORK.

THE MIST ELIMINATOR SECTION PLUGGED ALONG WITH THE NOZZLES HINDERING SYSTEM OPERATIONS. THE MIST ELIMINATOR DRAIN LINE WAS MODIFIED ALSO CAUSING OUTAGE TIME.

OTHER PROBLEMS ENCOUNTERED DURING THE MONTH INCLUDED A PLUGGED LIMESTONE FEEDER, INLET DAMPER PROBLEMS, SLURRY SUPPLY HEADER LEAKS AND STORAGE PUMP DISCHARGE VALVE REPAIRS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	A	11.8	11.8	12.5	11.8						
	B	72.7	72.7	73.5	72.7						
	C	70.7	70.7	71.5	70.7						
	D	41.3	41.3	47.9	41.3						
	SYSTEM	49.1	49.1	51.4	49.1			696	696	342	73.5

```
-----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         DURING FEBRUARY SOME OUTAGE TIME WAS DUE TO MODULE CLEANING AND THE
                         CLEANING OF THE MIST ELIMINATOR SECTION.

                         THE INLET DAMPER DRIVE WAS REPLACED DURING THE MONTH.

                         REPAIR OF THE FIBERGLASS ON THE SLURRY RECYCLE LINE HINDERED OPER-
                         ATIONS DURING THIS MONTH.

                         THE RECYCLE DISCHARGE VALVE WAS REPLACED CAUSING SOME DOWN TIME.

3/80   A           52.9         62.5        64.7        52.9
       B           73.2         86.6        86.9        73.2
       C           51.0         60.3        60.5        51.0
       D           34.0         40.2        45.9        34.0
       SYSTEM      52.8         62.4        65.1        52.8                  744   629    393  68.6

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         DURING MARCH NEW RECYCLE PUMP DISCHARGE VALVES WERE INSTALLED IN ORDER TO
                         ELIMINATE RESTRICTED FLOW OF THE OLD VALVES.

                         CARRIER BEARINGS ON THE INLET DAMPER WERE REPLACED IN ORDER TO MAINTAIN
                         MODULE ISOLATION CAPABILITY.

                         THE MIST ELIMINATOR WASH SYSTEM WAS CONVERTED TO RETURN WATER IN ORDER
                         TO ACHIEVE A HIGHER QUALITY ELIMINATION WASH WATER.

                         FIBERGLASS LINES ON THE RECYCLE PUMP DISCHARGE WERE ALSO REPAIRED DURING
                         MARCH.

4/80   A           53.0         81.7        95.9        52.9
       B           54.2         83.6        87.5        54.2
       C           57.2         88.3        95.3        57.2
       D           26.0         40.1        71.9        26.0
       SYSTEM      47.6         73.4        89.2        47.6                  720   466    342  35.3

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE MAJOR PROBLEM HINDERING SYSTEM OPERATIONS DURING APRIL WAS THE REBUILD
                         OF THE RECYCLE TANK MIXER.

                         MINOR PROBLEMS DURING THE MONTH WERE CAUSED BY THE INOPERABILITY OF THE
                         LIMESTONE HANDLING SYSTEM.

5/80   A           44.6         68.6        72.0        44.6
       B           45.7         70.3        73.5        45.7
       C           34.7         53.3        59.1        34.7
       D           43.6         67.0        73.9        43.6
       SYSTEM      42.1         64.8        69.7        42.1                  744   484    314  49.4

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         DURING MAY REPAIRS WERE MADE TO THE RECYCLE TANK RUBBER LINER.

                         EXPANSION JOINT LEAKS WERE ALSO REPAIRED DURING THE MONTH.

                         OTHER OPERATIONAL PROBLEMS INCLUDED THE REPLACEMENT OF THE LIMESTONE
                         STORAGE TANK MIXER MOTOR, MODIFICATION OF ROD DECKS TO REDUCE SYSTEM
                         DIFFERENTIAL PRESSURE AND REPAIR OF THE LIMESTONE FEEDER SYSTEM.

6/80   A           87.6         82.3        87.1        82.1
       B           86.8         82.6        86.0        82.3
       C           84.5         81.4        84.3        81.1
       D           80.0         73.1        75.8        72.9
       SYSTEM      84.8         79.9        84.3        79.6                  720   718    573  78.5
```

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

```
-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD    CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             A LEAK WAS REPAIRED IN THE SLURRY SUPPLY HEADER DURING JUNE.

                             WORK CONTINUED ON THE MODIFICATIONS BEING DONE ON THE ROD DECKS IN THE
                             ABSORBER MODULES.
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                                           SECTION 3
                 DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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  COMPANY NAME                                      CENTRAL ILLINOIS PUBLIC SERV
  PLANT NAME                                        NEWTON
  UNIT NUMBER                                       1
  CITY                                              NEWTON
  STATE                                             ILLINOIS
  GROSS UNIT GENERATING CAPACITY - MW                  617.0
  NET UNIT GENERATING CAPACITY W/FGD - MW              575.0
  EQUIVALENT SCRUBBED CAPACITY - MW                    617.0

  ** FUEL DATA
       FUEL TYPE                                    COAL
       FUEL GRADE                                   BITUMINOUS
       AVERAGE HEAT CONTENT - J/G                    25353.        ( 10900 BTU/LB)
       AVERAGE ASH CONTENT - %                          12.70
       AVERAGE MOISTURE CONTENT - %                      9.50
       AVERAGE SULFUR CONTENT - %                        2.25
       AVERAGE CHLORIDE CONTENT - %                       .20

  ** GENERAL EMISSION CONTROL SYSTEM DATA
       GENERAL PROCESS TYPE                         WET SCRUBBING
       PROCESS TYPE                                 DUAL ALKALI
       SYSTEM SUPPLIER                              BUELL DIVISION, ENVIROTECH
       NEW/RETROFIT                                 NEW
       ENERGY CONSUMPTION - %                          2.4
       INITIAL START-UP DATE                         9/79
       COMMERCIAL START-UP DATE                     12/79
       SO2 DESIGN REMOVAL EFFICIENCY - %               90.00
       PARTICULATE DESIGN REMOVAL EFFICIENCY - %       99.50
       ABSORBER SPARE CAPACITY INDEX - %                 .0
       ABSORBER SPARE COMPONENTS INDEX                   .0

  ** WATER LOOP
       TYPE                                         CLOSED
       FRESH MAKE-UP WATER - LITER/S                *******        (***** GPM)

  ** TREATMENT
       TYPE                                         POZ-O-TEC


-----------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD    CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------

 1/80   A          68.3        57.1        63.5        55.5
        B          66.4        60.6        64.9        58.9
        C          52.2        48.8        67.5        47.4
        D          21.0        19.1        26.3        18.5
        SYSTEM     52.0        46.4        57.8        45.1
                                                                             744    723    336

     ** PROBLEMS/SOLUTIONS/COMMENTS

                     DURING JANUARY TESTS WERE CONDUCTED TO CERTIFY THE GAS EMISSIONS MONITOR
                     AT NEWTON.

 2/80   A          61.1        42.4        45.0        42.4
        B          74.4        55.7        57.7        55.7
        C          78.2        58.5        59.1        58.5
        D            .0          .0          .0          .0
        SYSTEM     53.4        39.2        40.4        39.2
                                                                             696    696    273

     ** PROBLEMS/SOLUTIONS/COMMENTS

                     DURING FEBRUARY THE D MODULE WAS UNAVAILABLE DUE TO THE COLLAPSE OF THE
                     PRECOOLER MIST ELIMINATORS CAUSED BY A TEMPERATURE EXCURSION.

 3/80   A          53.4        52.6        53.1        52.3
        B          47.0        42.3        48.0        42.1
```

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	C	44.5	41.1	46.5	41.0						
	D	.0	.0	.0	.0						
	SYSTEM	36.2	34.0	36.9	33.9			744	740	252	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER, 1980, THE FOLLOWING PROBLEMS WERE ENCOUNTERED:
THE VALVES AND PIPING IN THE PRECOOLER LOOP EXPERIENCED CORROSION.
THE MIST ELIMINATOR ON THE D MODULE FAILED.
THE FLY ASH SUPPLIES DEPLETED.
RUBBER LINING AND DUCTWORK LINING FAILURES OCCURRED.
BOOSTER FAN EXPANSION JOINT FAILURE OCCURRED.
THE THICKENER EXPERIENCED PLUGGING.
FOR THE QUARTER, THE TOTAL SYSTEM WAS AVAILABLE 47.2% AND WAS UTILIZED 39.4% OF THE TIME.

4/80	A	33.8	31.3	31.4	31.3						
	B	35.4	25.8	25.8	25.8						
	C	37.4	35.6	35.6	35.6						
	D	26.1	21.8	21.8	21.8						
	SYSTEM	33.2	28.6	28.4	28.6			720	720	206	

** PROBLEMS/SOLUTIONS/COMMENTS

THE NEWTON 1 FGD SYSTEM WAS OUT OF SERVICE DURING THE FIRST 12 DAYS OF APRIL FOR NECESSARY REPAIRS ON THE OUTLET DUCT LININGS. THE UTILITY FEELS THAT THE LINING FAILURES MAY HAVE RESULTED FROM IMPROPER APPLICATION.

DURING THE LAST 18 DAYS OF APRIL MINOR PROBLEMS WERE EXPERIENCED WITH THE OCCURANCE OF PLUGGING IN THE SODIUM CARBONATE THICKENER AND CORROSION OF THE VALVES IN THE PRESATURATOR CIRCUIT.

5/80	A	.0	.0	.0	.0						
	B	9.7	9.6	9.6	6.2						
	C	9.7	9.6	9.6	6.2						
	D	.0	.0	.0	.0						
	SYSTEM	4.8	4.8	4.8	3.1			744	477	23	45.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY, THE FGD SYSTEM WAS DOWN BECAUSE THE FLUIDIZING STONES WERE CAKED WITH FLY ASH. THIS WAS CAUSED BY IMPROPER WIRING OF THE HEATER WHICH BLOWS OVER THE STONES. THE HEATER WAS REWIRED AND THE FLUIDIZING STONES REPLACED.

6/80	A	.0	.0	.0	.0						
	B	40.3	40.3	40.3	40.3						
	C	40.4	40.4	40.4	40.4						
	D	.0	.0	.0	.0						
	SYSTEM	20.2	20.2	20.2	20.2			720	720	145	63.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE THE A AND D MODULES WERE UNAVAILABLE FOR OPERATION BECAUSE THE MIST ELIMINATORS COLLAPSED.

THE SYSTEM WAS SHUTDOWN DURING THE FIRST HALF OF THE MONTH TO REPAIR THE DRY FLYASH COLLECTION SYSTEM.

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                                          SECTION 3
                        DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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  COMPANY NAME                                            COLORADO UTE ELECTRIC ASSN.
  PLANT NAME                                              CRAIG
  UNIT NUMBER                                             2
  CITY                                                    CRAIG
  STATE                                                   COLORADO
  GROSS UNIT GENERATING CAPACITY - MW                        447.0
  NET UNIT GENERATING CAPACITY W/FGD - MW                    4[illegible].0
  EQUIVALENT SCRUBBED CAPACITY - MW                          447.0

  ** FUEL DATA
      FUEL TYPE                                           COAL
      FUEL GRADE                                          SUBBITUMINOUS
      AVERAGE HEAT CONTENT - J/G                           23260.         ( 10000 BTU/LB)
      AVERAGE ASH CONTENT - %                                  8.00
      AVERAGE MOISTURE CONTENT - %                            16.00
      AVERAGE SULFUR CONTENT - %                                .45
      AVERAGE CHLORIDE CONTENT - %                              .00

  ** GENERAL EMISSION CONTROL SYSTEM DATA
      GENERAL PROCESS TYPE                                WET SCRUBBING
      PROCESS TYPE                                        LIMESTONE
      SYSTEM SUPPLIER                                     PEABODY PROCESS SYSTEMS
      NEW/RETROFIT                                        NEW
      ENERGY CONSUMPTION - %                                   5.4
      INITIAL START-UP DATE                               12/79
      COMMERCIAL START-UP DATE                             5/80
      SO2 DESIGN REMOVAL EFFICIENCY - %                       85.00
      PARTICULATE DESIGN REMOVAL EFFICIENCY - %               99.80
      ABSORBER SPARE CAPACITY INDEX - %                       20.0
      ABSORBER SPARE COMPONENTS INDEX                           .6

  ** WATER LOOP
      TYPE                                                CLOSED
      FRESH MAKE-UP WATER - LITER/S                          19.9          (  316 GPM)

  ** DISPOSAL
      TYPE                                                MINEFILL


-------------------------------------------PERFORMANCE DATA-------------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------

 1/80  SYSTEM
                                                                            744
 2/80  SYSTEM
                                                                            696
 3/80  SYSTEM
                                                                            744
        ** PROBLEMS/SOLUTIONS/COMMENTS

                             THE BOILER WAS DOWN AT THE END OF THE PERIOD DUE TO TURBINE RELATED
                             PROBLEMS.

                             WHEN FULL LOAD OPERATIONS WERE ATTEMPTED CONTROL PROBLEMS WERE ENCOUNTERED
                             WITH THE SCRUBBER.

                             PROBLEMS WITH OPENING/CLOSING THE BYPASS DAMPER HAVE BEEN ENCOUNTERED.
                             LARGER OPERATORS ARE BEING LOOKED AT TO SOLVE THE PROBLEM.
 4/80  SYSTEM
                                                                            720
        ** PROBLEMS/SOLUTIONS/COMMENTS

                             THE FGD SYSTEM IS STILL IN STARTUP PHASE.  TESTING IS BEING PERFORMED ON
                             THE SYSTEM, BUT THERE HAS BEEN NO OPERATIONAL DATA.
 5/80  A           28.4        27.5        28.4        28.4
```

COLORADO UTE ELECTRIC ASSN.: CRAIG 2 (CONT.)

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	B	33.1	32.1	33.1	33.1						
	C	38.4	37.2	38.4	38.4						
	D	18.6	18.0	18.6	18.6						
	SYSTEM	39.5	38.3	39.5	39.5			640	661	253	78.1

** PROBLEMS/SOLUTIONS/COMMENTS

CRAIG 2 UNIT COMMENCED COMMERCIAL OPERATION ON MAY 4, 1980. HOURS HAVE BEEN ADJUSTED ACCORDINGLY FOR THIS PERIOD TO 640.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	A	37.9	41.2	42.0	37.9						
	B	44.2	48.0	48.9	44.2						
	C	51.4	55.8	56.9	51.4						
	D	24.9	27.0	27.5	24.9						
	SYSTEM	52.8	57.4	58.5	52.8			720	663	380	69.7

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY AND JUNE, PROBLEMS WERE ENCOUNTERED WITH PLUGGING OF THE ABSORBER SPRAY NOZZLES.

A PROBLEM WAS ALSO ENCOUNTERED DURING INITIATION OF COMMERCIAL OPERATION WITH A HIGH PH LEVEL IN THE THICKENER UNDERFLOW.

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                                   SECTION 3
                DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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 COMPANY NAME                                     COLUMBUS & SOUTHERN OHIO ELEC.
 PLANT NAME                                       CONESVILLE
 UNIT NUMBER                                      5
 CITY                                             CONESVILLE
 STATE                                            OHIO
 GROSS UNIT GENERATING CAPACITY - MW                411.0
 NET UNIT GENERATING CAPACITY W/FGD - MW            375.0
 EQUIVALENT SCRUBBED CAPACITY - MW                  411.0

 ** FUEL DATA
      FUEL TYPE                                   COAL
      FUEL GRADE                                  BITUMINOUS
      AVERAGE HEAT CONTENT - J/G                   25237.        ( 10850 BTU/LB)
      AVERAGE ASH CONTENT - %                         15.10
      AVERAGE MOISTURE CONTENT - %                     7.50
      AVERAGE SULFUR CONTENT - %                       4.67
      AVERAGE CHLORIDE CONTENT - %                      .01

 ** GENERAL EMISSION CONTROL SYSTEM DATA
      GENERAL PROCESS TYPE                        WET SCRUBBING
      PROCESS TYPE                                LIME
      SYSTEM SUPPLIER                             AIR CORRECTION DIVISION, UOP
      NEW/RETROFIT                                NEW
      ENERGY CONSUMPTION - %                           3.9
      INITIAL START-UP DATE                        1/77
      COMMERCIAL START-UP DATE                     2/77
      SO2 DESIGN REMOVAL EFFICIENCY - %               89.50
      PARTICULATE DESIGN REMOVAL EFFICIENCY - %         .00
      ABSORBER SPARE CAPACITY INDEX - %                 .0
      ABSORBER SPARE COMPONENTS INDEX                   .0

 ** WATER LOOP
      TYPE                                        OPEN
      FRESH MAKE-UP WATER - LITER/S                  31.5        (  500 GPM)

 ** TREATMENT
      TYPE                                        POZ-O-TEC

 ** DISPOSAL
      TYPE                                        POND


------------------------------------------PERFORMANCE DATA-------------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  A             25.0        38.0        45.0        13.0
       B             29.0        50.0        59.0        17.0
       SYSTEM        27.0        44.0        52.0        15.0                     744   257    113  21.4

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         DURING JANUARY A BOILER OUTAGE OCCURRED FROM THE FIRST OF THE MONTH TO
                         JANUARY 20, DURING WHICH TIME MAINTENANCE WAS PERFORMED ON THE FGD SYSTEM.
 2/80  A             90.0        63.0        77.0        31.0
       B             93.0        69.0        84.0        34.0
       SYSTEM        92.0        66.0        81.0        33.0                     696   343    226  31.4

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         A BOILER OUTAGE LASTING APPROXIMATELY 17 DAYS ALSO OCCURRED DURING
                         FEBRUARY.

                         IN FEBRUARY, MIST ELIMINATOR NOZZLE PLUGGING OCCURRED CAUSING SOME FGD
                         SYSTEM OUTAGE TIME.

 3/80  A             88.         82.0        82.0        82.0
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---------------------------------------PERFORMANCE DATA----------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
       B          88.0        81.0        82.0        81.0
       SYSTEM     88.0        82.0        82.0        82.0
                                                                            744   744    606   75.4

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          DURING MARCH PROBLEMS WERE EXPERIENCED WITH THE IUCS SLUDGE STABILIZATION
                          PROCESS AND SOME OUTAGE TIME RESULTED.  ALSO DURING MARCH SOME GRID RODS
                          REQUIRED REPLACING AND SOME RUBBER LINER FAILURES OCCURRED.

                          THE MAJORITY OF THE MARCH FGD SYSTEM OUTAGE TIME WAS DUE TO CONTINUING
                          PROBLEMS WITH THE MIST ELIMINATOR NOZZLES.
4/80   A          94.6        84.4                    78.9
       B          74.9        65.8                    61.5
       SYSTEM     84.7        75.2                    70.3
                                                                            720   673    506   63.1

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          PROBLEMS WITH THE DAMPERS AND PRESATURATOR HOSES, ALONG WITH NOZZLES, WERE
                          THE CONTINUOUS CAUSES OF FGD SYSTEM OUTAGE TIME IN APRIL.
5/80   A          92.1        86.2                    86.2
       B          90.3        84.3                    84.3
       SYSTEM     91.3        85.2                    85.2
                                                                            744   744    634   69.5

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          IN MAY, CONTROLS AND INSTRUMENTATION DEVELOPED PROBLEMS THAT CAUSED SOME
                          OUTAGE TIME.
6/80   A          89.6        71.0                    70.7
       B          94.3        74.8                    74.4
       SYSTEM     86.4        72.9                    72.6
                                                                            720   717    523   65.1

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          EXTERNAL CAUSES (IUCS DISPOSAL FACILITY, LOW UNIT DEMAND, SERVICE WATER
                          PROBLEMS, ETC.) WERE RESPONSIBLE FOR THE MAJORITY OF THE JUNE OUTAGES.
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                                   SECTION 3
              DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
------------------------------------------------------------------------------------------------------

COMPANY NAME                                      COLUMBUS & SOUTHERN OHIO ELEC.
PLANT NAME                                        CONESVILLE
UNIT NUMBER                                       6
CITY                                              CONESVILLE
STATE                                             OHIO
GROSS UNIT GENERATING CAPACITY - MW                 411.0
NET UNIT GENERATING CAPACITY W/FGD - MW             375.0
EQUIVALENT SCRUBBED CAPACITY - MW                   411.0

** FUEL DATA
   FUEL TYPE                                      COAL
   FUEL GRADE                                     BITUMINOUS
   AVERAGE HEAT CONTENT - J/G                      25237.       ( 10850 BTU/LB)
   AVERAGE ASH CONTENT - %                            15.10
   AVERAGE MOISTURE CONTENT - %                        7.50
   AVERAGE SULFUR CONTENT - %                          4.67
   AVERAGE CHLORIDE CONTENT - %                         .01

** GENERAL EMISSION CONTROL SYSTEM DATA
   GENERAL PROCESS TYPE                           WET SCRUBBING
   PROCESS TYPE                                   LIME
   SYSTEM SUPPLIER                                AIR CORRECTION DIVISION, UOP
   NEW/RETROFIT                                   NEW
   ENERGY CONSUMPTION - %                              3.9
   INITIAL START-UP DATE                           6/78
   COMMERCIAL START-UP DATE                       **/**
   SO2 DESIGN REMOVAL EFFICIENCY - %                  89.50
   PARTICULATE DESIGN REMOVAL EFFICIENCY - %            .00
   ABSORBER SPARE CAPACITY INDEX - %                    .0
   ABSORBER SPARE COMPONENTS INDEX                      .0

** WATER LOOP
   TYPE                                           OPEN
   FRESH MAKE-UP WATER - LITER/S                    31.5         (  500 GPM)

** TREATMENT
   TYPE                                           POZ-O-TEC

** DISPOSAL
   TYPE                                           POND


-------------------------------------------PERFORMANCE DATA--------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  A          88.0         74.0        74.0        74.0
       B          89.0         78.0        78.0        78.0
       SYSTEM     89.0         76.0        76.0        76.0                744   744    566  73.9

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       NO MAJOR FGD SYSTEM RELATED PROBLEMS WERE REPORTED FOR JANUARY.

 2/80  A          87.0         75.0        78.0        69.0
       B          92.0         81.0        85.0        75.0
       SYSTEM     90.0         78.0        82.0        72.0                696   648    503  70.8

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       IN FEBRUARY, MIST ELIMINATOR NOZZLE PLUGGING OCCURRED CAUSING SOME OUTAGE
                       TIME.

 3/80  A          93.0         69.0        69.0        15.0
       B          94.0         76.0        76.0        16.0
       SYSTEM     94.0         73.0        73.0        16.0                744   160    117  17.6
```

COLUMBUS & SOUTHERN OHIO ELEC.: CONESVILLE 6 (CONT.)

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----------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS  HOURS HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             THE BOILER WENT DOWN ON MARCH 9 FOR A BOILER/TURBINE INSPECTION AND
                             REMAINED OUT OF SERVICE THROUGH THE END OF THE MONTH.

4/80   A          98.8         25.6                    11.1
       B          98.9         54.2                    23.5
       SYSTEM     98.9         40.1                    17.4                    720   312    125   19.8

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             CONTINUOUS PROBLEMS WITH DAMPERS, PRESATURATOR HOSES, AND NOZZLES
                             ACCOUNTED FOR MOST OF THE APRIL FGD SYSTEM OUTAGES.

5/80   A          96.9         58.3                    55.0
       B          96.1         33.8                    31.9
       SYSTEM     96.5         46.1                    43.4                    744   701    323   39.1

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             CONTROL AND INSTRUMENTATION PROBLEMS THAT DEVELOPED IN MAY WERE RESPONSI-
                             BLE FOR SOME FGD SYSTEM OUTAGE TIME.

6/80   A          97.1         73.6                    73.1
       SYSTEM     97.1         62.1                    61.7                    720   715    444   52.5

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             THE MAJORITY OF THE JUNE FGD SYSTEM OUTAGES WERE A RESULT OF EXTERNAL
                             CAUSES (IUCS DISPOSAL SYSTEM, WAST LOW UNIT DEMAND, SERVICE WATER, ETC.).
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	COMMONWEALTH EDISON	
PLANT NAME	POWERTON	
UNIT NUMBER	51	
CITY	PERKIN	
STATE	ILLINOIS	
REGULATORY CLASSIFICATION	E	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	774.	(1.800 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	1700.0	
GROSS UNIT GENERATING CAPACITY - MW	450.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	400.0	
NET UNIT GENERATING CAPACITY WO/FGD - MW	425.0	
EQUIVALENT SCRUBBED CAPACITY - MW	450.0	
** BOILER DATA		
SUPPLIER	BABCOCK & WILCOX	
TYPE	CYCLONE	
SERVICE LOAD	BASE	
COMMERCIAL SERVICE DATE	0/72	
MAXIMUM BOILER FLUE GAS FLOW - CU.M/S	722.18	(1530370 ACFM)
FLUE GAS TEMPERATURE - C	157.2	(315 F)
STACK HEIGHT - M	137.	(450 FT)
STACK TOP DIAMETER - M	6.4	(21.0 FT)
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	24516.	(10540 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		******
AVERAGE ASH CONTENT - %	9.16	
RANGE ASH CONTENT - %	******	
AVERAGE MOISTURE CONTENT - %	16.34	
RANGE MOISTURE CONTENT - %	******	
AVERAGE SULFUR CONTENT - %	3.53	
RANGE SULFUR CONTENT - %	******	
AVERAGE CHLORIDE CONTENT - %	********	
RANGE CHLORIDE CONTENT - %	******	
** GENERAL EMISSION CONTROL SYSTEM DATA		
SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT	
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	AIR CORRECTION DIVISION, UOP	
DEVELOPMENT LEVEL	FULL SCALE	
NEW/RETROFIT	RETROFIT	
SO2 DESIGN REMOVAL EFFICIENCY - %	75.50	
COMMERCIAL DATE	12/80	
INITIAL START-UP	4/80	
CONSTRUCTION COMPLETION	12/79	
CONSTRUCTION INITIATION	3/77	
CONTRACT AWARDED	2/76	
** FABRIC FILTER		
NUMBER	0	
** ESP		
NUMBER	1	
TYPE	COLD SIDE	
SUPPLIER	RESEARCH-COTTRELL	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	98.7	
FLUE GAS TEMPERATURE - C	157.2	(315 F)
** MECHANICAL COLLECTOR		
NUMBER	0	
** PARTICULATE SCRUBBER		
TYPE	NONE	
** ABSORBER		
NUMBER	3	
TYPE	MOBILE PACKED TOWER	
SUPPLIER	AIR CORRECTION DIVISION, UOP	

COMMONWEALTH EDISON: POWERTON 51 (CONT.)

```
     NUMBER OF STAGES                                3
     DIMENSIONS - FT                             55 X 30 X 18
     SHELL MATERIAL                              CARBON STEEL
     SHELL LINER MATERIAL                        NEOPRENE RUBBER
     INTERNAL MATERIAL                           FRP, CARPENTER 20
     BOILER LOAD/ABSORBER - %                      33.0
     GAS FLOW - CU.M/S                            240.73        ( 510123 ACFM)
     GAS TEMPERATURE - C                          157.2         (  315 F)
     LIQUID RECIRCULATION RATE - LITER/S         1575.          (25000 GPM)
     L/G RATIO - L/CU.M                             8.0         ( 60.0 GAL/1000ACF)
     PRESSURE DROP - KPA                            3.0         (12.0 IN-H2O)
     SUPERFICAL GAS VELOCITY - M/SEC                3.8         ( 12.5 FT/S)
     PARTICULATE INLET LOAD - NG/J                 43.          (  .100 LB/MMBTU)
     PARTICULATE OUTLET LOAD - NG/J                43.          (  .100 LB/MMBTU)
     SO2 INLET CONCENTRATION - PPM               2696
     SO2 OUTLET CONTRATION - PPM                  660
     SO2 DESIGN REMOVAL EFFICIENCY - %             75.5

 ** CENTRIFUGE
     NUMBER                                       0

 ** FANS
     TYPE                                        CENTRIFUGAL
     CONSTRUCTION MATERIALS                      T-1
     SERVICE - WET/DRY                           DRY

 ** VACUUM FILTER
     NUMBER                                       3
     TYPE                                        ROTATING DRUM
     CONSTRUCTION MATERIAL                       CARBON STEEL
     CAPACITY - M T/D                             1088.4        ( 1200 T/D)
     OUTLET SOLIDS - %                              55.0

 ** MIST ELIMINATOR
     NUMBER                                       2
     TYPE                                        CHEVRON
     CONSTRUCTION MATERIAL                       FRP
     CONFIGURATION                               HORIZONTAL
     WASH SYSTEM                                 WASH TOP AND BOTTOM LAYERS ONLY
     SUPERFICIAL GAS VELOCITY - M/S                 2.7         (  9.0 FT/S)

 ** PROCESS CONTROL CHEMISTRY
     CONTROL VARIABLES                           SO2, GAS FLOW, PH
     CONTROL MANNER                              AUTOMATIC
     MODE                                        FEEDBACK & FEEDFORWARD

 ** TANKS
     SERVICE                                     NUMBER
     -------                                     ------
     RECYCLE                                         3
     SLURRY MAKE-UP                                  1
     M.E. WASH                                       1
     WASTE SLURRY                                    2
     LIMESTONE TRANSFER                              2
     RECLAIMED WATER                                 1

 ** REHEATER
     TYPE                                        HOT AIR INJECTION
     HEATING MEDIUM                              STEAM
     TEMPERATURE BOOST - C                          13.9        (   25 F)
     ENERGY REQUIRED                             71,000,000 BTU/HR

 ** THICKENER
     NUMBER                                       1
     CONSTRUCTION MATERIAL                       CARBON STEEL
     DIAMETER - M                                   51.8        (170 FT)
     OUTLET SOLIDS - %                              35.0

 ** WATER LOOP
     TYPE                                        CLOSED
     FRESH MAKEUP WATER ADDITION - LITERS/S         35.3        (  560 GPM)

 ** REAGENT PREPARATION EQUIPMENT
     NUMBER OF BALL MILLS                            2
     BALL MILL CAPACITY- M T/H                      20.0        ( 22.0 TPH)
```

COMMONWEALTH EDISON: POWERTON 51 (CONT.)

```
 ** TREATMENT
     TYPE                                      POZ-O-TEC
     CONTRACTOR                                IUCS
     INLET- KG/S                                  20.6        ( 2727 LB/MIN)
     INLET SOLIDS - %                             35.0

 ** DISPOSAL
     NATURE                                    FINAL
     TYPE                                      LANDFILL

 ** DISPOSAL
     NATURE                                    INTERIM
     TYPE                                      POND
     LOCATION                                  ON-SITE
     CAPACITY - CU.M                              122300     (   100.0 ACRE-FT)

--------------------------------------------PERFORMANCE DATA---------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 4/80  SYSTEM
                                                                            720
 5/80  SYSTEM
                                                                            744
 6/80  SYSTEM
                                                                            720
```

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL FGD SYSTEM OPERATIONS BEGAN IN APRIL. THE FGD SYSTEM IS CURRENTLY OPERATING ON FLUEGAS GENERATED FROM THE BURNING OF LOW SULFUR WESTERN COAL. ONLY TWO OF THE THREE ABSORBER MODULES HAD BEEN OPERATED AS OF THE END OF JUNE. THE FGD SYSTEM IS NOT EXPECTED TO BE DECLARED COMMERCIAL UNTIL DECEMBER 1980.

THE UTILITY REPORTED THAT CURRENT OPERATING AND MAINTENANCE COST PROJECTIONS INDICATE THAT MANPOWER REQUIREMENTS FOR UNIT 51 WILL DOUBLE AND THAT ON A COST BASIS THE POTENTIAL OPTION OF BURNING LOW SULFUR COAL AS A COMPLIANCE STRATEGY WILL PROVE LESS EXPENSIVE THAN FGD.

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                                        SECTION 3
                   DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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 COMPANY NAME                                  COOPERATIVE POWER ASSOCIATION
 PLANT NAME                                    COAL CREEK
 UNIT NUMBER                                   1
 CITY                                          UNDERWOOD
 STATE                                         NORTH DAKOTA
 GROSS UNIT GENERATING CAPACITY - MW             545.0
 NET UNIT GENERATING CAPACITY W/FGD - MW         495.0
 EQUIVALENT SCRUBBED CAPACITY - MW               327.0

 ** FUEL DATA
     FUEL TYPE                                 COAL
     FUEL GRADE                                LIGNITE
     AVERAGE HEAT CONTENT - J/G                 14556.          ( 6258 BTU/LB)
     AVERAGE ASH CONTENT - %                       7.14
     AVERAGE MOISTURE CONTENT - %                 39.83
     AVERAGE SULFUR CONTENT - %                     .63
     AVERAGE CHLORIDE CONTENT - %                   .02

 ** GENERAL EMISSION CONTROL SYSTEM DATA
     GENERAL PROCESS TYPE                      WET SCRUBBING
     PROCESS TYPE                              LIME/ALKALINE FLYASH
     SYSTEM SUPPLIER                           COMBUSTION ENGINEERING
     NEW/RETROFIT                              NEW
     ENERGY CONSUMPTION - %                    *******
     INITIAL START-UP DATE                      8/79
     COMMERCIAL START-UP DATE                  **/**
     SO2 DESIGN REMOVAL EFFICIENCY - %            54.00
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %    99.50
     ABSORBER SPARE CAPACITY INDEX - %              .0
     ABSORBER SPARE COMPONENTS INDEX                .0

 ** WATER LOOP
     TYPE                                      OPEN
     FRESH MAKE-UP WATER - LITER/S             *******          (***** GPM)

 ** TREATMENT
     TYPE                                      FLYASH STABILIZATION

 ** DISPOSAL
     TYPE                                      LINED POND


-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ---- ----- ----- ------ ----- ------

 1/80  SYSTEM                100.0                    96.1                   744    715    715

        ** PROBLEMS/SOLUTIONS/COMMENTS

                               DURING JANUARY TWO MODULES AT A TIME WERE TAKEN OFF-LINE FOR INSPECTION
                               AND CLEANING.  SOME CRACKED NOZZLES AND PLUGGING PROBLEMS WERE FOUND
                               DURING THE INSPECTION.

                               SOME OUTAGE TIME DURING THE MONTH WAS CAUSED BY BOILER-RELATED PROBLEMS.
                               A BOILER TRIP WAS CAUSED BY A TURBINE MALFUNCTION.

                               AN HOUR OF OUTAGE TIME RESULTED FROM A LOSS OF POWER TO THE CONTROL
                               SYSTEM.  AN ABNORMAL POWER DRUM LEVEL WAS ALSO ENCOUNTERED.

                               A THREE TO FOUR HOUR OUTAGE WAS SCHEDULED TO MAKE REPAIRS ON FGD EQUIPMENT.

 2/80  SYSTEM                100.0                    99.9                   696    695    695
```

COOPERATIVE POWER ASSOCIATION: COAL CREEK 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

WHILE THE BOILER WAS OFF-LINE DUE TO ID FAN TROUBLE CAUSED BY ELECTRICAL GROUNDING, TWO MODULES WERE TAKEN OFF LINE SO CALIBRATIONS COULD BE DONE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	SYSTEM		100.0		96.1			744	715	715	

** PROBLEMS/SOLUTIONS/COMMENTS

BOILER TRIPS OCCURRED THREE TIMES DURING THE MONTH. ONE TRIP WAS DUE TO THE CUT DOWN OF TRANSMISSION POWER.

THE FGD SYSTEM WAS DOWN WITH THE BOILER FOR FOUR HOURS TO CLEAN THE FILTER ON THE BOILER STATOR COOLING PUMPS.

DURING MARCH STACK EMISSION TESTS WERE UNDERTAKEN. THE SYSTEM OPERATED WITH ONE MODULE DOWN DURING TESTING.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	11	96.7	58.3	100.0	21.4						
	12	100.0	96.1	100.0	30.0						
	13	100.0	96.9	100.0	35.6						
	14	100.0	96.9	100.0	35.6						
	SYSTEM	99.2	83.2	100.0	30.6			720	264	220	26.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS OFF LINE FOR APPROXIMATELY 19 DAYS FOR THE ANNUAL UNIT OUTAGE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	11	88.3	68.8	100.0	35.6						
	12	79.3	18.6	100.0	9.3						
	13	91.9	79.6	100.0	39.8						
	14	91.2	35.5	100.0	17.7						
	SYSTEM	87.7	50.6	100.0	25.3			744	372	188	28.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE ANNUAL UNIT OUTAGE WAS COMPLETED IN THE BEGINNING OF THE MONTH. THERE WERE PROBLEMS WITH BOILER STARTUP AFTER THIS OUTAGE CAUSING LOW OPERABILITY OF THE FGD SYSTEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	11	92.9	49.3	100.0	49.2						
	12	98.5	47.6	100.0	47.5						
	13	74.7	42.2	100.0	42.1						
	14	93.5	73.0	100.0	72.8						
	SYSTEM	89.9	53.0	100.0	52.9			720	718	381	58.5

** PROBLEMS/SOLUTIONS/COMMENTS

THERE WERE NO MAJOR PROBLEMS REPORTED DURING JUNE. ROUTINE MAINTENANCE AND REPAIRS WERE DONE THROUGHOUT THE MONTH.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

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COMPANY NAME                                      DELMARVA POWER & LIGHT
PLANT NAME                                        DELAWARE CITY
UNIT NUMBER                                       1
CITY                                              DELAWARE CITY
STATE                                             DELAWARE
REGULATORY CLASSIFICATION                         E
PARTICULATE EMISSION LIMITATION - NG/J              129.          (  .300 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J                    ******          (****** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW                  180.0
GROSS UNIT GENERATING CAPACITY - MW                  60.0
NET UNIT GENERATING CAPACITY W/FGD - MW           *******
NET UNIT GENERATING CAPACITY WO/FGD - MW          *******
EQUIVALENT SCRUBBED CAPACITY - MW                    60.0

** BOILER DATA
    SUPPLIER                                      RILEY STOKER
    TYPE                                          PULVERIZED COKE
    SERVICE LOAD                                  BASE
    COMMERCIAL SERVICE DATE                       10/56
    MAXIMUM BOILER FLUE GAS FLOW - CU.M/S           417.63        ( 885000 ACFM)
    FLUE GAS TEMPERATURE - C                        215.6         ( 420 F)
    STACK HEIGHT - M                                152.          ( 500 FT)
    STACK TOP DIAMETER - M                            6.1         ( 20.0 FT)

** FUEL DATA
    FUEL TYPE                                     COKE
    FUEL GRADE                                    FLUID PETROLEUM COKE
    AVERAGE HEAT CONTENT - J/G                     32564.         ( 14000 BTU/LB)
    RANGE HEAT CONTENT - BTU/LB                                    13500-14500
    AVERAGE ASH CONTENT - %                           .50
    RANGE ASH CONTENT - %                         .3-.7
    AVERAGE MOISTURE CONTENT - %                      .70
    RANGE MOISTURE CONTENT - %                    .5-1.2
    AVERAGE SULFUR CONTENT - %                       7.00
    RANGE SULFUR CONTENT - %                      5-8
    AVERAGE CHLORIDE CONTENT - %                  ********
    RANGE CHLORIDE CONTENT - %                    ******

** GENERAL EMISSION CONTROL SYSTEM DATA
    SALEABLE PRODUCT/THROWAWAY PRODUCT            SALEABLE PRODUCT
    GENERAL PROCESS TYPE                          WET SCRUBBING
    PROCESS TYPE                                  WELLMAN LORD
    SYSTEM SUPPLIER                               DAVY MCKEE
    A-E FIRM                                      DAVY MCKEE
    CONSTRUCTION FIRM                             DAVY MCKEE
    DEVELOPMENT LEVEL                             FULL SCALE
    NEW/RETROFIT                                  RETROFIT
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %       90.00
    SO2 DESIGN REMOVAL EFFICIENCY - %               90.00
    COMMERCIAL DATE                               5/80
    INITIAL START-UP                              5/80
    CONSTRUCTION COMPLETION                       4/80
    CONSTRUCTION INITIATION                       1/78
    CONTRACT AWARDED                              9/77
    LETTER OF INTENT SIGNED                       8/76
    STARTED PRELIMINAY DESIGN                     10/77

** FABRIC FILTER
    TYPE                                          NONE

** ESP
    NUMBER                                        3
    SUPPLIER                                      JOY WESTERN
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %      95.0
    FLUE GAS CAPACITY - CU.M/S                    104.3           ( 221000 ACFM)
    FLUE GAS TEMPERATURE - C                       54.4           (  130 F)
    PRESSURE DROP - KPA                           *******         (***** IN-H2O)
    PARTICULATE OUTLET LOAD - G/CU.M                 .69          (    .30 GR/SCF)

** MECHANICAL COLLECTOR
    NUMBER                                        3
    TYPE                                          TUBULAR
```

```
DELMARVA POWER & LIGHT: DELAWARE CITY 1 (CONT.)

     SUPPLIER                                        PRAT-DANIEL
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %         92.0

 ** PARTICULATE SCRUBBER
     NUMBER                                           3
     TYPE                                            VENTURI
     SUPPLIER                                        AIRPOL
     NUMBER OF STAGES                                   1
     SHELL MATERIAL                                  CARBON STEEL
     LINING MATERIAL                                 GLASS FLAKE, ACID BRICK, CAROBRAX BRICK
     NUMBER OF NOZZLES                                  1
     TYPE OF NOZZLES                                 OPEN PIPE WITH REFRAX TIP
     BOILER LOAD/SCRUBBER - %                          100.0
     FLUE GAS CAPACITY - CU.M/S                        139.2        ( 295000 ACFM)
     FLUE GAS TEMPERATURE - C                          215.6        (  420 F)
     LIQUID RECIRCULATION RATE - LITER/S               315.0        ( 5000 GPM)
     PRESSURE DROP - KPA                             *******        (***** IN-H2O)
     PARTICULATE INLET LOAD - G/CU.M                     3.2        (  1.39 GR/SCF)
     PARTICULATE OUTLET LOAD - G/CU.M                     .6        (  .250 GR/SCF)
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %          81.5
     SO2 INLET CONCENTRATION - PPM                    3500.000
     SO2 DESIGN REMOVAL EFFICIENCY - %                    .0

 ** ABSORBER
     NUMBER                                           3
     TYPE                                            TRAY TOWER
     INITIAL START UP                                 4/80
     SUPPLIER                                        DAVY MCKEE
     NUMBER OF STAGES                                   4
     DIMENSIONS - FT                                 20 X 20
     SHELL MATERIAL                                  REINFORCED CONCRETE
     SHELL LINER MATERIAL                            TILE
     INTERNAL MATERIAL                               316L SS
     BOILER LOAD/ABSORBER - %                          100.0
     GAS FLOW - CU.M/S                                 103.82       ( 220000 ACFM)
     GAS TEMPERATURE - C                                54.4        (  130 F)
     LIQUID RECIRCULATION RATE - LITER/S                25.         (  400 GPM)
     PARTICULATE INLET LOAD - G/CU.M                      .2        (  .100 GR/SCF)
     PARTICULATE OUTLET LOAD- G/CU.M                      .2        (  .100 GR/SCF)
     PARTICULATE REMOVAL EFFICIENCY - %                   .0
     SO2 INLET CONCENTRATION - PPM                    3500
     SO2 OUTLET CONTRATION - PPM                       390

 ** CENTRIFUGE
     TYPE                                            NONE

 ** FANS
     NUMBER                                           3
     CONSTRUCTION MATERIALS                          CARBON STEEL
     SERVICE - WET/DRY                               DRY
     CAPACITY - CU.M/S                                 139.21       ( 295000 ACFM)

 ** VACUUM FILTER
     TYPE                                            NONE

 ** MIST ELIMINATOR
     NUMBER                                           3
     TYPE                                            CHEVRON
     CONSTRUCTION MATERIAL                           GE NORYL
     CONFIGURATION                                   HORIZONTAL
     NUMBER OF STAGES                                   1
     NUMBER OF PASSES                                   1
     FREEBOARD DISTANCE - M                             1.83        ( 6.0 FT)
     DEPTH - M                                          2.29        ( 7.5 FT)
     WASH SYSTEM                                     INTERMITTANT SPRAYS
     PRESSURE DROP - KPA                                 .1         (  .3 IN-H2O)

 ** PROCESS CONTROL CHEMISTRY
     CONTROL VARIABLES                               PH, SOLIDS, SP.G., CONC.
     CONTROL MANNER                                  AUTOMATIC
     MODE                                            FEED BACK
     SENSOR LOCATION                                 GAS OUTLET, SOLUTION OUTLET
```

DELMARVA POWER & LIGHT: DELAWARE CITY 1 (CONT.)

```
 ** PUMPS
     SERVICE                                    NUMBER
     -------                                    ------
     ******                                     ****

 ** REHEATER
     NUMBER                                      3
     TYPE                                       HOT AIR INJECTION
     HEATING MEDIUM                             FUEL GAS
     TEMPERATURE BOOST - C                         27.8        (   50 F)

 ** THICKENER
     TYPE                                       NONE

 ** WATER LOOP
     TYPE                                       CLOSED

 ** BYPRODUCTS
     BYPRODUCT NATURE                           SULFURIC ACID
     BYPRODUCT QUANTITY - M T/H                    11.34       ( 12.50 TPH)
     BYPRODUCT QUALITY - %                         93.0
     DISPOSITION                                SALES AND INTERNAL USE

 ** TREATMENT
     TYPE                                       NEUTRALIZATION

 ** DISPOSAL
     NATURE                                     FINAL
     TYPE                                       LINED POND


------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL   PER BOILER  FGD   CAP.
                                                               SO2  PART. HOURS HOURS HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 5/80  SYSTEM                                                                744

 6/80  SYSTEM                                                                720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         INITIAL AND COMMERCIAL OPERATIONS BEGAN ON MAY 22, 1980.  NO MAJOR PROBLEMS
                         WERE REPORTED DURING STARTUP.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

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COMPANY NAME                                      DELMARVA POWER & LIGHT
PLANT NAME                                        DELAWARE CITY
UNIT NUMBER                                       2
CITY                                              DELAWARE CITY
STATE                                             DELAWARE
REGULATORY CLASSIFICATION                         E
PARTICULATE EMISSION LIMITATION - NG/J              129.         (  .300 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J                    ******         (****** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW                  180.0
GROSS UNIT GENERATING CAPACITY - MW                  60.0
NET UNIT GENERATING CAPACITY W/FGD - MW           *******
NET UNIT GENERATING CAPACITY WO/FGD - MW          *******
EQUIVALENT SCRUBBED CAPACITY - MW                    60.0

** BOILER DATA
    SUPPLIER                                      RILEY STOKER
    TYPE                                          PULVERIZED COKE
    SERVICE LOAD                                  BASE
    COMMERCIAL SERVICE DATE                       10/56
    MAXIMUM BOILER FLUE GAS FLOW - CU.M/S           417.63         ( 885000 ACFM)
    FLUE GAS TEMPERATURE - C                        215.6          ( 420 F)
    STACK HEIGHT - M                                152.           ( 500 FT)
    STACK TOP DIAMETER - M                            6.1          ( 20.0 FT)

** FUEL DATA
    FUEL TYPE                                     COKE
    FUEL GRADE                                    FLUID PETROLEUM COKE
    AVERAGE HEAT CONTENT - J/G                     32564.          ( 14000 BTU/LB)
    RANGE HEAT CONTENT - BTU/LB                                     13500-14500
    AVERAGE ASH CONTENT - %                           .50
    RANGE ASH CONTENT - %                         .3-.7
    AVERAGE MOISTURE CONTENT - %                      .70
    RANGE MOISTURE CONTENT - %                    .5-1.2
    AVERAGE SULFUR CONTENT - %                       7.00
    RANGE SULFUR CONTENT - %                      5-8
    AVERAGE CHLORIDE CONTENT - %                  ********
    RANGE CHLORIDE CONTENT - %                    ******

** GENERAL EMISSION CONTROL SYSTEM DATA
    SALEABLE PRODUCT/THROWAWAY PRODUCT            SALEABLE PRODUCT
    GENERAL PROCESS TYPE                          WET SCRUBBING
    PROCESS TYPE                                  WELLMAN LORD
    SYSTEM SUPPLIER                               DAVY MCKEE
    A-E FIRM                                      DAVY MCKEE
    CONSTRUCTION FIRM                             DAVY MCKEE
    DEVELOPMENT LEVEL                             FULL SCALE
    NEW/RETROFIT                                  RETROFIT
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %        99.00
    SO2 DESIGN REMOVAL EFFICIENCY - %                90.00
    COMMERCIAL DATE                                5/80
    INITIAL START-UP                               5/80
    CONSTRUCTION COMPLETION                        4/80
    CONSTRUCTION INITIATION                        1/78
    CONTRACT AWARDED                               9/77
    LETTER OF INTENT SIGNED                        8/76
    STARTED PRELIMINAY DESIGN                     10/77

** FABRIC FILTER
    TYPE                                          NONE

** ESP
    NUMBER                                         3
    SUPPLIER                                      JOY WESTERN
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %        95.0
    FLUE GAS CAPACITY - CU.M/S                      104.3          ( 221000 ACFM)
    FLUE GAS TEMPERATURE - C                         54.4          (   130 F)
    PRESSURE DROP - KPA                           *******          (***** IN-H2O)
    PARTICULATE OUTLET LOAD - G/CU.M                  .69          (    .30 GR/SCF)

** MECHANICAL COLLECTOR
    NUMBER                                         3
    TYPE                                          TUBULAR
```

```
DELMARVA POWER & LIGHT: DELAWARE CITY 2 (CONT.)

     SUPPLIER                                   PRAT-DANIEL
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %     92.0

 ** PARTICULATE SCRUBBER
     NUMBER                                      3
     TYPE                                       VENTURI
     SUPPLIER                                   AIRPOL
     NUMBER OF STAGES                              1
     SHELL MATERIAL                             CARBON STEEL
     LINING MATERIAL                            GLASS FLAKE, ACID BRICK, CAROBRAX BRICK
     NUMBER OF NOZZLES                             1
     TYPE OF NOZZLES                            OPEN PIPE WITH REFRAX TIP
     BOILER LOAD/SCRUBBER - %                     100.0
     FLUE GAS CAPACITY - CU.M/S                   139.2         ( 295000 ACFM)
     FLUE GAS TEMPERATURE - C                     215.6         (   420 F)
     LIQUID RECIRCULATION RATE - LITER/S          315.0         ( 5000 GPM)
     PRESSURE DROP - KPA                        *******         (***** IN-H2O)
     PARTICULATE INLET LOAD - G/CU.M                3.2         (   1.39 GR/SCF)
     PARTICULATE OUTLET LOAD - G/CU.M                .6         (   .250 GR/SCF)
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %     81.5
     SO2 INLET CONCENTRATION - PPM               3500.000
     SO2 DESIGN REMOVAL EFFICIENCY - %               .0

 ** ABSORBER
     NUMBER                                      3
     TYPE                                       TRAY TOWER
     INITIAL START UP                            4/80
     SUPPLIER                                   DAVY MCKEE
     NUMBER OF STAGES                              4
     DIMENSIONS - FT                            20 X 20
     SHELL MATERIAL                             REINFORCED CONCRETE
     SHELL LINER MATERIAL                       TILE
     INTERNAL MATERIAL                          316L SS
     BOILER LOAD/ABSORBER - %                     100.0
     GAS FLOW - CU.M/S                            103.82        ( 220000 ACFM)
     GAS TEMPERATURE - C                           54.4         (   130 F)
     LIQUID RECIRCULATION RATE - LITER/S           25.          (   400 GPM)
     PARTICULATE INLET LOAD - G/CU.M                 .2         (   .100 GR/SCF)
     PARTICULATE OUTLET LOAD- G/CU.M                 .2         (   .100 GR/SCF)
     PARTICULATE REMOVAL EFFICIENCY - %              .0
     SO2 INLET CONCENTRATION - PPM               3500
     SO2 OUTLET CONTRATION - PPM                  390

 ** CENTRIFUGE
     TYPE                                       NONE

 ** FANS
     NUMBER                                      3
     CONSTRUCTION MATERIALS                     CARBON STEEL
     SERVICE - WET/DRY                          DRY
     CAPACITY - CU.M/S                            139.21        ( 295000 ACFM)

 ** VACUUM FILTER
     TYPE                                       NONE

 ** MIST ELIMINATOR
     NUMBER                                      3
     TYPE                                       CHEVRON
     CONSTRUCTION MATERIAL                      GE NORYL
     CONFIGURATION                              HORIZONTAL
     NUMBER OF STAGES                              1
     NUMBER OF PASSES                              1
     FREEBOARD DISTANCE - M                        1.83         ( 6.0 FT)
     DEPTH - M                                     2.29         ( 7.5 FT)
     WASH SYSTEM                                INTERMITTANT SPRAYS
     PRESSURE DROP - KPA                             .1         (   .3 IN-H2O)

 ** PROCESS CONTROL CHEMISTRY
     CONTROL VARIABLES                          PH, SOLIDS, SP.G., CONC.
     CONTROL MANNER                             AUTOMATIC
     MODE                                       FEED BACK
     SENSOR LOCATION                            GAS OUTLET, SOLUTION OUTLET
```

```
DELMARVA POWER & LIGHT: DELAWARE CITY 2 (CONT.)

  ** PUMPS
       SERVICE                                           NUMBER
       -------                                           ------
       ******                                            ****

  ** REHEATER
       NUMBER                                             3
       TYPE                                              HOT AIR INJECTION
       HEATING MEDIUM                                    FUEL GAS
       TEMPERATURE BOOST - C                                27.8        (   50 F)

  ** THICKENER
       TYPE                                              NONE

  ** WATER LOOP
       TYPE                                              CLOSED

  ** BYPRODUCTS
       BYPRODUCT NATURE                                  SULFURIC ACID
       BYPRODUCT QUANTITY - M T/H                          11.34        ( 12.50 TPH)
       BYPRODUCT QUALITY - %                               93.0
       DISPOSITION                                       SALES AND INTERNAL USE

  ** TREATMENT
       TYPE                                              NEUTRALIZATION

  ** DISPOSAL
       NATURE                                            FINAL
       TYPE                                              LINED POND

----------------------------------------PERFORMANCE DATA----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 5/80  SYSTEM                                                                744

 6/80  SYSTEM                                                                720

      ** PROBLEMS/SOLUTIONS/COMMENTS

                           INITIAL AND COMMERCIAL OPERATIONS BEGAN ON MAY 22, 1980.  NO MAJOR PROBLEMS
                           WERE REPORTED DURING STARTUP.
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                                          SECTION 3
                     DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
--------------------------------------------------------------------------------------------------

  COMPANY NAME                                   DELMARVA POWER & LIGHT
  PLANT NAME                                     DELAWARE CITY
  UNIT NUMBER                                    3
  CITY                                           DELAWARE CITY
  STATE                                          DELAWARE
  REGULATORY CLASSIFICATION                      E
  PARTICULATE EMISSION LIMITATION - NG/J           129.          (  .300 LB/MMBTU)
  SO2 EMISSION LIMITATION - NG/J                 ******          (****** LB/MMBTU)
  NET PLANT GENERATING CAPACITY - MW               180.0
  GROSS UNIT GENERATING CAPACITY - MW               60.0
  NET UNIT GENERATING CAPACITY W/FGD - MW        *******
  NET UNIT GENERATING CAPACITY WO/FGD - MW       *******
  EQUIVALENT SCRUBBED CAPACITY - MW                 60.0

  ** BOILER DATA
      SUPPLIER                                   RILEY STOKER
      TYPE                                       PULVERIZED COKE
      SERVICE LOAD                               BASE
      COMMERCIAL SERVICE DATE                    10/56
      MAXIMUM BOILER FLUE GAS FLOW - CU.M/S        417.63        ( 885000 ACFM)
      FLUE GAS TEMPERATURE - C                     215.6         ( 420 F)
      STACK HEIGHT - M                             152.          ( 500 FT)
      STACK TOP DIAMETER - M                         6.1         ( 20.0 FT)

  ** FUEL DATA
      FUEL TYPE                                  COKE
      FUEL GRADE                                 FLUID PETROLEUM COKE
      AVERAGE HEAT CONTENT - J/G                  32564.         ( 14000 BTU/LB)
      RANGE HEAT CONTENT - BTU/LB                                 13500-14500
      AVERAGE ASH CONTENT - %                          .50
      RANGE ASH CONTENT - %                      .3-.7
      AVERAGE MOISTURE CONTENT - %                     .70
      RANGE MOISTURE CONTENT - %                 .5-1.2
      AVERAGE SULFUR CONTENT - %                      7.00
      RANGE SULFUR CONTENT - %                   5-8
      AVERAGE CHLORIDE CONTENT - %               ********
      RANGE CHLORIDE CONTENT - %                 ******

  ** GENERAL EMISSION CONTROL SYSTEM DATA
      SALEABLE PRODUCT/THROWAWAY PRODUCT         SALEABLE PRODUCT
      GENERAL PROCESS TYPE                       WET SCRUBBING
      PROCESS TYPE                               WELLMAN LORD
      SYSTEM SUPPLIER                            DAVY MCKEE
      A-E FIRM                                   DAVY MCKEE
      CONSTRUCTION FIRM                          DAVY MCKEE
      DEVELOPMENT LEVEL                          FULL SCALE
      NEW/RETROFIT                               RETROFIT
      PARTICULATE DESIGN REMOVAL EFFICIENCY - %     90.00
      SO2 DESIGN REMOVAL EFFICIENCY - %             90.00
      COMMERCIAL DATE                             5/80
      INITIAL START-UP                            5/80
      CONSTRUCTION COMPLETION                     4/80
      CONSTRUCTION INITIATION                     1/78
      CONTRACT AWARDED                            9/77
      LETTER OF INTENT SIGNED                     8/76
      STARTED PRELIMINAY DESIGN                  10/77

  ** FABRIC FILTER
      TYPE                                       NONE

  ** ESP
      NUMBER                                      3
      SUPPLIER                                   JOY WESTERN
      PARTICULATE DESIGN REMOVAL EFFICIENCY - %     95.0
      FLUE GAS CAPACITY - CU.M/S                   104.3         ( 221000 ACFM)
      FLUE GAS TEMPERATURE - C                      54.4         (  130 F)
      PRESSURE DROP - KPA                        *******         (***** IN-H2O)
      PARTICULATE OUTLET LOAD - G/CU.M                .69        (    .30 GR/SCF)

  ** MECHANICAL COLLECTOR
      NUMBER                                      3
      TYPE                                       TUBULAR
```

```
DELMARVA POWER & LIGHT: DELAWARE CITY 3 (CONT.)

     SUPPLIER                                      PRAT-DANIEL
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %        92.0

 ** PARTICULATE SCRUBBER
     NUMBER                                        3
     TYPE                                          VENTURI
     SUPPLIER                                      AIRPOL
     NUMBER OF STAGES                                 1
     SHELL MATERIAL                                CARBON STEEL
     LINING MATERIAL                               GLASS FLAKE, ACID BRICK, CAROBRAX BRICK
     NUMBER OF NOZZLES                                1
     TYPE OF NOZZLES                               OPEN PIPE WITH REFRAX TIP
     BOILER LOAD/SCRUBBER - %                        100.0
     FLUE GAS CAPACITY - CU.M/S                      139.2          ( 295000 ACFM)
     FLUE GAS TEMPERATURE - C                        215.6          (  420 F)
     LIQUID RECIRCULATION RATE - LITER/S             315.0          ( 5000 GPM)
     PRESSURE DROP - KPA                           *******          (***** IN-H2O)
     PARTICULATE INLET LOAD - G/CU.M                   3.2          (  1.39 GR/SCF)
     PARTICULATE OUTLET LOAD - G/CU.M                   .6          (  .250 GR/SCF)
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %       81.5
     SO2 INLET CONCENTRATION - PPM                 3500.000
     SO2 DESIGN REMOVAL EFFICIENCY - %                  .0

 ** ABSORBER
     NUMBER                                        3
     TYPE                                          TRAY TOWER
     INITIAL START UP                               4/80
     SUPPLIER                                      DAVY MCKEE
     NUMBER OF STAGES                                 4
     DIMENSIONS - FT                               20 X 20
     SHELL MATERIAL                                REINFORCED CONCRETE
     SHELL LINER MATERIAL                          TILE
     INTERNAL MATERIAL                             316L SS
     BOILER LOAD/ABSORBER - %                        100.0
     GAS FLOW - CU.M/S                               103.82         ( 220000 ACFM)
     GAS TEMPERATURE - C                              54.4          (  130 F)
     LIQUID RECIRCULATION RATE - LITER/S              25.           (  400 GPM)
     PARTICULATE INLET LOAD - G/CU.M                    .2          (  .100 GR/SCF)
     PARTICULATE OUTLET LOAD- G/CU.M                    .2          (  .100 GR/SCF)
     PARTICULATE REMOVAL EFFICIENCY - %                 .0
     SO2 INLET CONCENTRATION - PPM                  3500
     SO2 OUTLET CONTRATION - PPM                     390

 ** CENTRIFUGE
     TYPE                                          NONE

 ** FANS
     NUMBER                                        3
     CONSTRUCTION MATERIALS                        CARBON STEEL
     SERVICE - WET/DRY                             DRY
     CAPACITY - CU.M/S                               139.21         ( 295000 ACFM)

 ** VACUUM FILTER
     TYPE                                          NONE

 ** MIST ELIMINATOR
     NUMBER                                        3
     TYPE                                          CHEVRON
     CONSTRUCTION MATERIAL                         GE NORYL
     CONFIGURATION                                 HORIZONTAL
     NUMBER OF STAGES                                 1
     NUMBER OF PASSES                                 1
     FREEBOARD DISTANCE - M                           1.83        ( 6.0 FT)
     DEPTH - M                                        2.29        ( 7.5 FT)
     WASH SYSTEM                                   INTERMITTANT SPRAYS
     PRESSURE DROP - KPA                                .1        (  .3 IN-H2O)

 ** PROCESS CONTROL CHEMISTRY
     CONTROL VARIABLES                             PH, SOLIDS, SP.G., CONC.
     CONTROL MANNER                                AUTOMATIC
     MODE                                          FEED BACK
     SENSOR LOCATION                               GAS OUTLET, SOLUTION OUTLET
```

DELMARVA POWER & LIGHT: DELAWARE CITY 3 (CONT.)

```
** PUMPS
    SERVICE                                      NUMBER
    -------                                      ------
    ******                                       ****

** REHEATER
    NUMBER                                        3
    TYPE                                         HOT AIR INJECTION
    HEATING MEDIUM                               FUEL GAS
    TEMPERATURE BOOST - C                           27.8        (    50 F)

** THICKENER
    TYPE                                         NONE

** WATER LOOP
    TYPE                                         CLOSED

** BYPRODUCTS
    BYPRODUCT NATURE                             SULFURIC ACID
    BYPRODUCT QUANTITY - M T/H                      11.34       ( 12.50 TPH)
    BYPRODUCT QUALITY - %                           93.0
    DISPOSITION                                  SALES AND INTERNAL USE

** TREATMENT
    TYPE                                         NEUTRALIZATION

** DISPOSAL
    NATURE                                       FINAL
    TYPE                                         LINED POND

------------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 5/80  SYSTEM                                                                744

 6/80  SYSTEM                                                                720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          INITIAL AND COMMERCIAL OPERATIONS BEGAN ON MAY 22, 1980.  NO MAJOR PROBLEMS
                          WERE REPORTED DURING STARTUP.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

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COMPANY NAME                                          DUQUESNE LIGHT
PLANT NAME                                            ELRAMA
UNIT NUMBER                                           1-4
CITY                                                  ELRAMA
STATE                                                 PENNSYLVANIA
GROSS UNIT GENERATING CAPACITY - MW                     510.0
NET UNIT GENERATING CAPACITY W/FGD - MW                 475.0
EQUIVALENT SCRUBBED CAPACITY - MW                       510.0

** FUEL DATA
    FUEL TYPE                                         COAL
    FUEL GRADE                                        ******
    AVERAGE HEAT CONTENT - J/G                         26400.         ( 11350 BTU/LB)
    AVERAGE ASH CONTENT - %                              21.00
    AVERAGE MOISTURE CONTENT - %                      ********
    AVERAGE SULFUR CONTENT - %                            2.20
    AVERAGE CHLORIDE CONTENT - %                      ********

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                              WET SCRUBBING
    PROCESS TYPE                                      LIME
    SYSTEM SUPPLIER                                   CHEMICO DIVISION, ENVIROTECH
    NEW/RETROFIT                                      RETROFIT
    ENERGY CONSUMPTION - %                                3.5
    INITIAL START-UP DATE                             10/75
    COMMERCIAL START-UP DATE                          10/75
    SO2 DESIGN REMOVAL EFFICIENCY - %                    83.00
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %            99.00
    ABSORBER SPARE CAPACITY INDEX - %                    25.0
    ABSORBER SPARE COMPONENTS INDEX                       1.0

** WATER LOOP
    TYPE                                              OPEN
    FRESH MAKE-UP WATER - LITER/S                     *******         (***** GPM)

** TREATMENT
    TYPE                                              POZ-O-TEC

** DISPOSAL
    TYPE                                              LANDFILL


------------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

12/79  101        100.0        51.6       100.0        48.5
       201        100.0        90.9       100.0        85.5
       301        100.0       100.0        96.1       100.0
       401         88.1        68.6        84.4        64.5
       501        100.0       100.0       100.0       100.0
       SYSTEM     100.0       100.0       100.0        98.7                   744   700   587

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          THERE HAVE BEEN NO SCRUBBER-RELATED OUTAGES OVER THE SEPTEMBER THRU
                          DECEMBER PERIOD.

                          THE SLUDGE IS NOW BEING TRUCKED TO A REMOTE SITE 10 MILES AWAY CAUSING
                          OPERATING COSTS TO INCREASE.

                          THE NEW SO2 MONITOR HAS PLUGGED ONLY ONCE SINCE OCTOBER AND HAS REQUIRED
                          ONLY 4 HOURS OF MAINTENANCE PER WEEK.

 1/80  101         95.8        91.2        94.8        75.2
       201         87.1       100.0        87.1        87.1
       301         84.6       100.0        84.6        84.6
```

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	401	86.4	55.6	77.1	45.8						
	501	100.0	100.0	100.0	100.0						
	SYSTEM	100.0	100.0	100.0	98.2			744	613	528	
2/80	101	100.0	85.4	100.0	60.5						
	201	100.0	100.0	100.0	96.6						
	301	100.0	100.0	100.0	100.0						
	401	100.0	100.0	100.0	70.7						
	501	77.6	56.8	64.0	40.2						
	SYSTEM	100.0	100.0	100.0	92.0			696	493	427	

** PROBLEMS/SOLUTIONS/COMMENTS

THE NEW SO2 MONITOR IS STILL OPERATING WELL AND HAS LOGGED SIX MONTHS OF OPERATION.

THE HIGH AVAILABILITIES ARE DUE TO THE 5TH MODULE BEING A TRUE SPARE. AS OF FEBRUARY 1980 AND ARE STILL OPERATING WITHOUT ANY MAJOR PROBLEMS.

THE TWO RUBBER LINED WORMEN RECYCLE PUMPS HAVE NOW LOGGED 14,000 HOURS

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	101	100.0	100.0	100.0	100.0						
	201	100.0	100.0	100.0	100.0						
	301	73.7	73.7	73.7	73.7						
	401	100.0	48.4	100.0	48.4						
	501	78.1	78.1	78.1	78.1						
	SYSTEM	100.0	100.0	100.0	100.0			744	744	595	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS AVAILABLE FOR OPERATION THE ENTIRE MONTH OF MARCH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	101	40.3	38.1	40.0	40.0						
	201	72.3	72.3	72.3	72.3						
	301	87.3	87.3	87.3	87.3						
	401	100.0	100.0	100.0	100.0						
	501	100.0	100.0	100.0	100.0						
	SYSTEM	99.4	99.4	100.0	99.4			720	720	572	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL THE 101 AND 201 RECYCLE PUMP IMPELLERS HAD TO BE REPLACED. THIS CAUSED 6 HOURS OF OUTAGE TIME FOR THESE TWO MODULES. NO OTHER FGD SYSTEM OUTAGES OCCURRED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	101	100.0	100.0	100.0	100.0						
	201	40.1	37.1	38.2	37.1						
	301	94.1	89.0	93.8	89.0						
	401	90.3	71.2	88.0	71.2						
	501	96.8	96.8	96.8	96.8						
	SYSTEM	100.0	98.5	100.0	98.5			744	744	586	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY THE FGD SYSTEM WAS AVAILABLE FOR OPERATION THE ENTIRE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THE MONTH OF JUNE.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	DUQUESNE LIGHT	
PLANT NAME	PHILLIPS	
UNIT NUMBER	1-6	
CITY	SOUTH HEIGHT	
STATE	PENNSYLVANIA	
GROSS UNIT GENERATING CAPACITY - MW	408.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	373.0	
EQUIVALENT SCRUBBED CAPACITY - MW	408.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26830.	(11535 BTU/LB)
AVERAGE ASH CONTENT - %	16.27	
AVERAGE MOISTURE CONTENT - %	5.02	
AVERAGE SULFUR CONTENT - %	1.92	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	CHEMICO DIVISION, ENVIROTECH	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	3.4	
INITIAL START-UP DATE	7/73	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	83.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	POZ-O-TEC	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/79	101	.0	.0	.0	.0						
	201	99.9	100.0	100.0	100.0						
	301	90.7	100.0	90.6	90.0						
	401	77.7	100.0	81.2	77.0						
	SYSTEM	67.1	75.0	68.0	67.0			744	567	494	

** PROBLEMS/SOLUTIONS/COMMENTS

PRESENTLY THE UTILITY HAS BEEN ADDING SODIUM THIOSULFATE TO THE LIME TO PREVENT SCALE FORMATION. THIS PROCESS HAS IMPROVED SO2 COLLECTION AS WELL.

THE SCRUBBER FAN HOUSING LINERS ARE BEING REPLACED.

THE MECHANICAL COLLECTORS ARE BEING UPGRADED TO IMPROVE THE QUALITY OF THE WET SLUDGE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	101	.0	.0	.0	.0						
	201	98.1	100.0	98.0	93.3						
	301	100.0	100.0	100.0	99.0						
	401	97.6	100.0	97.5	96.0						
	SYSTEM	73.9	89.0	73.9	72.0			744	604	536	

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
						SO2	PART.				
2/80	101	13.7	17.3	13.7	13.7						
	201	91.6	100.0	91.7	91.7						
	301	86.2	100.0	86.0	84.6						
	401	94.2	100.0	94.0	90.5						
	SYSTEM	71.4	79.3	71.4	70.1			696	551	488	

** PROBLEMS/SOLUTIONS/COMMENTS

SODIUM THIOSULFATE ADDITION CONTINUED THROUGH THE FIRST QUARTER AND MIST ELIMINATOR SCALING HAS BEEN SIGNIFICANTLY REDUCED. 2000-5000 HOURS OF OPERATION HAVE BEEN LOGGED WITHOUT MIST ELIMINATOR SCALE UP. THE UTILITY REPORTS THAT SO2 REMOVAL EFFICIENCY HAS IMPROVED 3% DUE TO THIS AS WELL. THE UTILITY IS LOOKING INTO THE ADDITION OF SODIUM THIOSULFATE AT ELRAMA.

THE FAN RUBBER LINERS HAVE BEEN A CONTINUAL PROBLEM. TWO WILL BE REPLACED WITH INCONEL THE NEXT TIME THE RUBBER LINERS FAIL.

THE PHILLIPS FGD SYSTEM HAD A SYSTEM AVAILABILITY OF 71.6% FOR THE YEAR 1979.

3/80	101	94.7	84.0	94.0	84.0						
	201	59.0	53.9	56.8	53.9						
	301	48.4	40.3	43.8	40.3						
	401	95.4	95.3	99.8	95.3						
	SYSTEM	60.3	54.7	73.6	54.7			744	744	407	

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS WERE ENCOUNTERED WITH THE MODULE 101 ID FAN. THE MODULE WAS TAKEN OFF LINE SO THE ID FAN COULD BE BALANCED.

PROBLEMS WERE ENCOUNTERED WITH THE HUB BOLTS ON THE ID FAN OF MODULE 201, CAUSING THE MODULE TO COME OFF LINE FOR 11 DAYS.

THE RUBBER LINING ON THE ID FAN HOUSING OF MODULE 301 NEEDED REPAIR DURING MARCH.

MODULE 401 WAS TAKEN OFF LINE FOR APPROXIMATELY 2 HOURS SO REPAIRS COULD BE MADE ON THE SCRUBBER MAKE-UP VALVES.

4/80	101	92.6	89.4	92.4	89.4						
	201	14.2	10.0	10.5	10.0						
	301	99.2	99.0	99.8	99.0						
	401	95.8	94.6	98.6	94.6						
	SYSTEM	96.9	73.3	75.6	73.3			720	720	527	

** PROBLEMS/SOLUTIONS/COMMENTS

ON APRIL 5 MODULE 101 WAS TAKEN OFF LINE DUE TO ID FAN BEARING PROBLEMS. LATER IN THE MONTH THE MODULE WAS SHUTDOWN DUE TO AN ID FAN INSTRUMENTATION PRESSURE SWITCH PROBLEM.

TOWARDS THE LATTER PART OF APRIL, MODULE 201 WAS SHUTDOWN DUE TO ID FAN BEARING PROBLEMS. THIS PROBLEM WAS CORRECTED BY BALANCING THE FAN.

MODULE 301 WAS REMOVED FROM OPERATION ON APRIL 11 DUE TO AN ID FAN MOTOR MALFUNCTION.

THE RECYCLE PUMP PACKING ON MODULE 401 NEEDED TO BE REPLACED DURING THE MONTH.

5/80	101	67.5	53.9	62.3	53.9						
	201	81.6	69.0	78.9	69.0						
	301	91.7	73.1	89.8	73.1						
	401	92.2	75.9	90.6	75.9						
	SYSTEM	83.2	68.0	80.2	68.0			744	744	506	

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

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---------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                               SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
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** PROBLEMS/SOLUTIONS/COMMENTS

MODULE 101 CAME OFF LINE IN MAY SO REPAIRS COULD BE MADE ON THE CONTROL DAMPER AND TO INSTRUMENTATION.

DURING MAY MODULE 201 EXPERIENCED PROBLEMS WITH THE MIST ELIMINATOR AND THE ID FAN. THE MODULE WAS TAKEN OFF LINE FOR APPROXIMATELY TWO DAYS TO WASH THE MISTELIMINATOR INTERNALS AND ONE DAY TO REPAIR THE ID FAN BEARING.

MODULE 301 EXPERIENCED ID FAN PROBLEMS AND WAS TAKEN OFF LINE WHILE THE ID FAN WAS BALANCED.

MODULE 401 WAS SHUTDOWN APPROXIMATELY 58 HOURS SO THAT THE ID FAN CONTROL DAMPERS COULD BE INSPECTED.

5/80 SYSTEM

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THE MONTH OF JUNE.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	INDIANAPOLIS POWER & LIGHT	
PLANT NAME	PETERSBURG	
UNIT NUMBER	3	
CITY	PETERSBURG	
STATE	INDIANA	
GROSS UNIT GENERATING CAPACITY - MW	532.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	515.0	
EQUIVALENT SCRUBBED CAPACITY - MW	532.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	25004.	(10750 BTU/LB)
AVERAGE ASH CONTENT - %	********	
AVERAGE MOISTURE CONTENT - %	********	
AVERAGE SULFUR CONTENT - %	3.25	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	AIR CORRECTION DIVISION, UOP	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	2.4	
INITIAL START-UP DATE	12/77	
COMMERCIAL START-UP DATE	12/77	
SO2 DESIGN REMOVAL EFFICIENCY - %	85.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.30	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	55.6	(882 GPM)
** TREATMENT		
TYPE	POZ-O-TEC	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER 1980, THE ENTIRE SCRUBBER PACKING BED WAS LOST DUE TO EXCESSIVE WEAR OF THE NEOPRENE FOAM PACKING BALLS. THE UNIT WILL BE TAKEN OFF LINE IN APRIL TO ACCOMODATE NECESSARY REPAIRS AND REPLACEMENT OF THE BALLS.

BYPASS DAMPER FAILURES ALSO OCCURRED AND ARE REPORTED TO BE A CONTINUAL PROBLEM. MODIFICATIONS WERE MADE TO THE GULLOTINE TYPE DAMPERS DURING THE PERIOD.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

INDIANAPOLIS POWER & LIGHT: PETERSBURG 3 (CONT.)

PERFORMANCE DATA											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THE PERIOD APRIL 1980 THROUGH JUNE 1980.

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                                          SECTION 3
                   DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
----------------------------------------------------------------------------------------------------------

 COMPANY NAME                                       KANSAS CITY POWER & LIGHT
 PLANT NAME                                         HAWTHORN
 UNIT NUMBER                                        3
 CITY                                               KANSAS CITY
 STATE                                              MISSOURI
 GROSS UNIT GENERATING CAPACITY - MW                   90.0
 NET UNIT GENERATING CAPACITY W/FGD - MW               85.0
 EQUIVALENT SCRUBBED CAPACITY - MW                     90.0

 ** FUEL DATA
     FUEL TYPE                                      COAL
     FUEL GRADE                                     BITUMINOUS
     AVERAGE HEAT CONTENT - J/G                      22795.         (  9800 BTU/LB)
     AVERAGE ASH CONTENT - %                            11.00
     AVERAGE MOISTURE CONTENT - %                   ********
     AVERAGE SULFUR CONTENT - %                           .60
     AVERAGE CHLORIDE CONTENT - %                   ********

 ** GENERAL EMISSION CONTROL SYSTEM DATA
     GENERAL PROCESS TYPE                           WET SCRUBBING
     PROCESS TYPE                                   LIME
     SYSTEM SUPPLIER                                COMBUSTION ENGINEERING
     NEW/RETROFIT                                   RETROFIT
     ENERGY CONSUMPTION - %                             2.2
     INITIAL START-UP DATE                          11/72
     COMMERCIAL START-UP DATE                       **/**
     SO2 DESIGN REMOVAL EFFICIENCY - %                 70.00
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %         99.00
     ABSORBER SPARE CAPACITY INDEX - %                    .0
     ABSORBER SPARE COMPONENTS INDEX                      .0

 ** WATER LOOP
     TYPE                                           CLOSED
     FRESH MAKE-UP WATER - LITER/S                  *******         (***** GPM)

 ** TREATMENT
     TYPE                                           FLYASH STABILIZATION

 ** DISPOSAL
     TYPE                                           POND


-----------------------------------------PERFORMANCE DATA-------------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL    PER  BOILER  FGD    CAP.
                                                                SO2  PART.  HOURS  HOURS  HOURS  FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- -----  -----  ------ -----  ------

10/79  SYSTEM                  100.0                   91.0                   744    677    677

11/79  SYSTEM                  100.0                   38.1                   720    274    274

12/79  SYSTEM                  100.0                   91.9                   744    684    684

 1/80  SYSTEM                  100.0                   93.0                   744    692    692

 2/80  SYSTEM                  100.0                  100.0                   696    696    696

 3/80  SYSTEM                  100.0                  100.0                   744    744    744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                        THE FGD SYSTEM WAS AVAILABLE 100% OF THE TIME THE BOILER OPERATED.  NO
                        PROBLEMS WERE ENCOUNTERED.

 4/80  SYSTEM                                          68.0                   720           490

 5/80  SYSTEM                                          60.0                   744           446

 6/80  SYSTEM                                          66.0                   720           475
```

KANSAS CITY POWER & LIGHT: HAWTHORN 3 (CONT.)

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-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                   THE UNIT 3 BOILER EXPERIENCED SUPERHEATER AND ECONOMIZER LEAKS DURING THE
                                   APRIL-JUNE PERIOD ACCOUNTING FOR THE LOW SCRUBBER UTILIZATION FIGURES.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KANSAS CITY POWER & LIGHT	
PLANT NAME	HAWTHORN	
UNIT NUMBER	4	
CITY	KANSAS CITY	
STATE	MISSOURI	
GROSS UNIT GENERATING CAPACITY - MW	90.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	85.0	
EQUIVALENT SCRUBBED CAPACITY - MW	90.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	22795.	(9800 BTU/LB)
AVERAGE ASH CONTENT - %	11.00	
AVERAGE MOISTURE CONTENT - %	********	
AVERAGE SULFUR CONTENT - %	.60	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	COMBUSTION ENGINEERING	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	2.2	
INITIAL START-UP DATE	8/72	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	70.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	FLYASH STABILIZATION	
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/79	SYSTEM		100.0		91.0			744	677	677	
11/79	SYSTEM		100.0		38.1			720	274	274	
12/79	SYSTEM		100.0		91.9			744	684	684	
1/80	SYSTEM				.0			744	0	0	
2/80	SYSTEM				.0			696	0	0	
3/80	SYSTEM				.0			744	0	0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT REMAINED OFF LINE THROUGH THE FIRST QUARTER 1980 BECAUSE OF A TURBINE GENERATOR OVERHAUL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM				65.0			720		468	

KANSAS CITY POWER & LIGHT: HAWTHORN 4 (CONT.)

** PROBLEMS/SOLUTIONS/COMMENTS

LOW APRIL SCRUBBER UTILIZATION FIGURES OCCURRED BECAUSE THE BOILER WAS OUT OF SERVICE FOR SCHEDULED MAINTENANCE DURING PART OF THE MONTH.

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM				90.0			744		670	
6/80	SYSTEM				98.0			720		706	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO UNUSUAL FGD SYSTEM PROBLEMS OCCURRED DURING MAY AND JUNE.

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                                           SECTION 3
                DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
----------------------------------------------------------------------------------------------------

 COMPANY NAME                                   KANSAS CITY POWER & LIGHT
 PLANT NAME                                     LA CYGNE
 UNIT NUMBER                                    1
 CITY                                           LA CYGNE
 STATE                                          KANSAS
 GROSS UNIT GENERATING CAPACITY - MW              874.0
 NET UNIT GENERATING CAPACITY W/FGD - MW          820.0
 EQUIVALENT SCRUBBED CAPACITY - MW                874.0

 ** FUEL DATA
     FUEL TYPE                                  COAL
     FUEL GRADE                                 SUBBITUMINOUS
     AVERAGE HEAT CONTENT - J/G                  21915.         (  9421 BTU/LB)
     AVERAGE ASH CONTENT - %                       24.36
     AVERAGE MOISTURE CONTENT - %                   9.60
     AVERAGE SULFUR CONTENT - %                     5.39
     AVERAGE CHLORIDE CONTENT - %                    .03

 ** GENERAL EMISSION CONTROL SYSTEM DATA
     GENERAL PROCESS TYPE                       WET SCRUBBING
     PROCESS TYPE                               LIMESTONE
     SYSTEM SUPPLIER                            BABCOCK & WILCOX
     NEW/RETROFIT                               NEW
     ENERGY CONSUMPTION - %                         2.7
     INITIAL START-UP DATE                       2/73
     COMMERCIAL START-UP DATE                    6/73
     SO2 DESIGN REMOVAL EFFICIENCY - %             80.00
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %     99.50
     ABSORBER SPARE CAPACITY INDEX - %               .0
     ABSORBER SPARE COMPONENTS INDEX                 .0

 ** WATER LOOP
     TYPE                                       CLOSED
     FRESH MAKE-UP WATER - LITER/S                 72.3         ( 1148 GPM)

 ** DISPOSAL
     TYPE                                       UNLINED POND


------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL    PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

12/79  SYSTEM       .0                                      .0                   744      0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE BOILER WENT DOWN FOR AN OVERHAUL ON OCTOBER 19TH AND WAS OUT OF SERVICE
                         THROUGH DECEMBER.

                         EXTENSIVE MAINTENANCE WORK BEGAN ON THE FGD SYSTEM LATE IN OCTOBER CAUSING
                         THE SYSTEM TO BE UNAVAILABLE DURING NOVEMBER AND DECEMBER.  SOME ITEMS
                         INCLUDED IN THE MAINTENANCE WERE:
                             THE INSTALLATION OF TWO NEW SPRAY HEADERS IN SIX OF THE MODULES, RE-
                             PLACEMENT OF THE ABSORBER SIDEWALLS, REPLACEMENT OF THE MODULE OUTLET
                             DUCTS AND DAMPERS, AND VARIOUS DUCTWORK PATCHING.
 1/80  SYSTEM       .0                                      .0                   744      0      0    .0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE BOILER AND FGD SYSTEM REMAINED UNAVAILABLE DURING JANUARY DUE TO THE
                         ON-GOING GENERATOR/TURBINE OVERHAUL AND THE EXTENSIVE FGD SYSTEM MOD-
                         IFICATIONS BEING PERFORMED.

 2/80  A          98.2         84.1        95.7        20.0
       B          98.2         58.3        92.9        13.2
```

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	C	97.4	66.2	89.7	14.9						
	D	99.1	45.9	92.3	10.3						
	E	98.2	93.0	97.3	21.0						
	F	99.1	91.7	97.3	20.7						
	G	99.1	91.7	97.3	20.7						
	H	99.6	92.4	97.3	20.8						
	SYSTEM	98.6	77.7	95.3	17.5			696	157	122	10.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE TURBINE/GENERATOR OVERHAUL WAS COMPLETED IN FEBRUARY AND THE BOILER AND FGD SYSTEM RETURNED TO SERVICE ON FEBRUARY 20. THE FGD SYSTEM WAS AVAILABLE FOR OPERATION MOST OF THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	A	94.6	100.0	100.0	4.3						
	B	96.2	100.0	100.0	4.3						
	C	96.1	100.0	100.0	4.3						
	D	96.1	100.0	100.0	4.3						
	E	95.8	93.8	100.0	4.0						
	F	94.7	53.1	100.0	2.3						
	G	93.3	31.3	100.0	1.3						
	H	95.7	.0		.0						
	SYSTEM	95.3	72.3	100.0	3.1			744	32	23	1.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS OPERATED FOR ONLY 23 HOURS IN MARCH AS A RESULT OF GENERATOR/TURBINE PROBLEMS. SOME ROUTINE CLEANING AND INSPECTIONS OF THE FGD SYSTEM WERE PERFORMED DURING THE OUTAGE TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	A	96.3	94.1	94.5	61.7						
	B	95.1	78.4	91.4	51.4						
	C	95.0	97.5	92.9	63.9						
	D	96.7	93.6	94.8	61.4						
	E	95.3	86.0	92.3	56.4						
	F	92.5	76.3	87.2	50.0						
	G	97.0	68.4	93.9	44.9						
	H	97.0	62.9	93.4	41.3						
	SYSTEM	95.6	82.2	92.6	53.9			720	472	388	37.6
5/80	A	96.4	89.4	96.0	84.1						
	B	94.6	87.9	93.9	82.7						
	C	95.7	88.3	95.2	83.1						
	D	95.9	83.9	95.1	78.9						
	E	96.1	84.4	95.3	79.4						
	F	96.5	89.3	96.2	84.0						
	G	96.1	96.0	94.0	90.3						
	H	96.8	82.3	96.2	77.4						
	SYSTEM	96.0	87.7	95.5	82.5			744	700	614	49.9

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED FOR THE MONTHS OF APRIL OR MAY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS NOT AVAILABLE FOR THE MONTH OF JUNE.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KANSAS POWER & LIGHT	
PLANT NAME	JEFFREY	
UNIT NUMBER	1	
CITY	WAMEGO	
STATE	KANSAS	
GROSS UNIT GENERATING CAPACITY - MW	720.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	680.0	
EQUIVALENT SCRUBBED CAPACITY - MW	540.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	18899.	(8125 BTU/LB)
AVERAGE ASH CONTENT - %	5.80	
AVERAGE MOISTURE CONTENT - %	28.00	
AVERAGE SULFUR CONTENT - %	.32	
AVERAGE CHLORIDE CONTENT - %	.01	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	COMBUSTION ENGINEERING	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	8/78	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	80.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00	
ABSORBER SPARE CAPACITY INDEX - %	20.0	
ABSORBER SPARE COMPONENTS INDEX	1.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	35.1	(557 GPM)
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM	100.0	100.0	100.0	67.7			744	504	504	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WENT OFF LINE FOR TEN DAYS IN MARCH FOR A SCHEDULED INSPECTION. DURING THE BOILER OUTAGE GENERAL MAINTENANCE WAS PERFORMED ON THE FGD SYSTEM. OTHER THAN THIS OUTAGE, THE FGD UNIT OPERATED 100% OF THE TIME IN MARCH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	
5/80	SYSTEM	100.0	100.0	100.0	100.0			744	744	744	
6/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE APRIL THROUGH JUNE PERIOD THE FGD SYSTEM OPERATED 100% OF THE TIME.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

```
COMPANY NAME                                   KANSAS POWER & LIGHT
PLANT NAME                                     JEFFREY
UNIT NUMBER                                    2
CITY                                           WAMEGO
STATE                                          KANSAS
REGULATORY CLASSIFICATION                      D
PARTICULATE EMISSION LIMITATION - NG/J         ******          (****** LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J                 ******          (****** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW             *******
GROSS UNIT GENERATING CAPACITY - MW              700.0
NET UNIT GENERATING CAPACITY W/FGD - MW          683.0
NET UNIT GENERATING CAPACITY WO/FGD - MW       *******
EQUIVALENT SCRUBBED CAPACITY - MW                490.0

** BOILER DATA
    SUPPLIER                                   ******
    TYPE                                       PULVERIZED COAL
    SERVICE LOAD                               BASE
    COMMERCIAL SERVICE DATE                    **/**
    MAXIMUM BOILER FLUE GAS FLOW - CU.M/S      ********        (******* ACFM)
    FLUE GAS TEMPERATURE - C                   *******         (**** F)
    STACK HEIGHT - M                             183.          ( 600 FT)
    STACK TOP DIAMETER - M                     *******         (***** FT)

** FUEL DATA
    FUEL TYPE                                  COAL
    FUEL GRADE                                 ******
    AVERAGE HEAT CONTENT - J/G                  18841.         (  8100 BTU/LB)
    RANGE HEAT CONTENT - BTU/LB                                 ******
    AVERAGE ASH CONTENT - %                        5.80
    RANGE ASH CONTENT - %                      7-8
    AVERAGE MOISTURE CONTENT - %                  28.00
    RANGE MOISTURE CONTENT - %                 ******
    AVERAGE SULFUR CONTENT - %                      .30
    RANGE SULFUR CONTENT - %                   ******
    AVERAGE CHLORIDE CONTENT - %               ********
    RANGE CHLORIDE CONTENT - %                 ******

** GENERAL EMISSION CONTROL SYSTEM DATA
    SALEABLE PRODUCT/THROWAWAY PRODUCT         THROWAWAY PRODUCT
    GENERAL PROCESS TYPE                       WET SCRUBBING
    PROCESS TYPE                               LIMESTONE
    SYSTEM SUPPLIER                            COMBUSTION ENGINEERING
    A-E FIRM                                   BLACK & VEATCH
    DEVELOPMENT LEVEL                          FULL SCALE
    NEW/RETROFIT                               NEW
    SO2 DESIGN REMOVAL EFFICIENCY - %             80.00
    COMMERCIAL DATE                             1/80
    INITIAL START-UP                            4/80

** ESP
    NUMBER                                      2
    TYPE                                       COLD SIDE
    SUPPLIER                                   COMBUSTION ENGINEERING
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %     98.6
    FLUE GAS CAPACITY - CU.M/S                  1327.9         (2814000 ACFM)
    FLUE GAS TEMPERATURE - C                     139.4         (  283 F)
    PARTICULATE OUTLET LOAD - G/CU.M                .07        (    .03 GR/SCF)

** PARTICULATE SCRUBBER
    TYPE                                       NONE

** ABSORBER
    TYPE                                       SPRAY TOWER
    INITIAL START UP                            6/80
    SUPPLIER                                   COMBUSTION ENGINEERING

** MIST ELIMINATOR
    TYPE                                       CHEVRON
```

EPA UTILITY FGD SURVEY: APRIL - JUNE 1980

KANSAS POWER & LIGHT: JEFFREY 2 (CONT.)

** PUMPS

SERVICE	NUMBER
******	****

** REHEATER

TYPE	BYPASS

** WATER LOOP

TYPE	CLOSED

** TREATMENT

TYPE	BOTTOM ASH STABILIZATION

** DISPOSAL

NATURE	FINAL
TYPE	LINED POND
LOCATION	ON-SITE
TRANSPORTATION	PUMPED

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL OPERATIONS AT JEFFREY 2 BEGAN IN JANUARY 1980. NO MAJOR PROBLEMS HAVE BEEN ENCOUNTERED SINCE STARTUP.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL THE SYSTEM WAS STILL IN THE SHAKEDOWN/DEBUGGING PHASE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	100.0	100.0	100.0	100.0			744	744	744	
6/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	

** PROBLEMS/SOLUTIONS/COMMENTS

COMMERCIAL OPERATIONS BEGAN ON MAY 1, 1980. SINCE THEN THERE HAVE BEEN NO PROBLEMS ENCOUNTERED WITH THE FGD SYSTEM. THE UNIT HAS OPERATED 100% OF THE TIME.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KANSAS POWER & LIGHT	
PLANT NAME	LAWRENCE	
UNIT NUMBER	4	
CITY	LAWRENCE	
STATE	KANSAS	
GROSS UNIT GENERATING CAPACITY - MW	125.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	115.0	
EQUIVALENT SCRUBBED CAPACITY - MW	125.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	23260.	(10000 BTU/LB)
AVERAGE ASH CONTENT - %	9.80	
AVERAGE MOISTURE CONTENT - %	12.00	
AVERAGE SULFUR CONTENT - %	.55	
AVERAGE CHLORIDE CONTENT - %	.03	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	COMBUSTION ENGINEERING	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	1/76	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	73.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	98.90	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	FORCED OXIDATION	
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM		100.0		100.0			744	744	744	
2/80	SYSTEM		100.0		100.0			696	696	696	
3/80	SYSTEM		100.0		100.0			744	744	744	

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR PROBLEMS WERE REPORTED FOR THE LAWRENCE 4 SCRUBBER DURING THE FIRST QUARTER 1980.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0	100.0	100.0	80.0			720	576	576	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS OFF LINE FOR SIX DAYS IN APRIL FOR A SCHEDULED INSPECTION. DURING THE BOILER OUTAGE GENERAL MAINTENANCE WAS PERFORMED ON THE FGD SYSTEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	100.0	100.0	100.0	100.0			744	744	744	
6/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	

EPA UTILITY FGD SURVEY: APRIL - JUNE 1980

KANSAS POWER & LIGHT: LAWRENCE 4 (CONT.)

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-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD    CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE FGD SYSTEM OPERATED 100% OF THE TIME IN MAY AND JUNE.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KANSAS POWER & LIGHT	
PLANT NAME	LAWRENCE	
UNIT NUMBER	5	
CITY	LAWRENCE	
STATE	KANSAS	
GROSS UNIT GENERATING CAPACITY - MW	420.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	400.0	
EQUIVALENT SCRUBBED CAPACITY - MW	420.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	23260.	(10000 BTU/LB)
AVERAGE ASH CONTENT - %	9.80	
AVERAGE MOISTURE CONTENT - %	12.00	
AVERAGE SULFUR CONTENT - %	.55	
AVERAGE CHLORIDE CONTENT - %	.03	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	COMBUSTION ENGINEERING	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	11/71	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	52.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	98.90	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	FORCED OXIDATION	
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM		100.0		100.0			744	744	744	
2/80	SYSTEM		100.0		51.7			696	360	360	
3/80	SYSTEM		100.0		54.8			744	408	408	

** PROBLEMS/SOLUTIONS/COMMENTS

THE LAWRENCE 5 SCRUBBER OPERATED WITHOUT ANY MAJOR PROBLEMS DURING THE FIRST QUARTER 1980. THE BOILER WAS DOWN FROM MID-FEBRUARY TO MID-MARCH FOR TURBINE REPAIRS, DURING WHICH TIME GENERAL SCRUBBER MAINTENANCE WAS PERFORMED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	
5/80	SYSTEM	100.0	100.0	100.0	80.6			744	600	600	
6/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	

KANSAS POWER & LIGHT: LAWRENCE 5 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS DOWN FOR SIX DAYS DURING MAY FOR A SCHEDULED INSPECTION. DURING THIS TIME GENERAL MAINTENANCE WAS PERFORMED ON THE FGD SYSTEM. OTHER THAN THIS TIME, THE FGD SYSTEM OPERATED 100% OF THE TIME DURING THE APRIL-JUNE PERIOD.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KENTUCKY UTILITIES	
PLANT NAME	GREEN RIVER	
UNIT NUMBER	1-3	
CITY	CENTRAL CITY	
STATE	KENTUCKY	
GROSS UNIT GENERATING CAPACITY - MW	64.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	60.0	
EQUIVALENT SCRUBBED CAPACITY - MW	64.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	25586.	(11000 BTU/LB)
AVERAGE ASH CONTENT - %	13.40	
AVERAGE MOISTURE CONTENT - %	12.10	
AVERAGE SULFUR CONTENT - %	4.00	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	AMERICAN AIR FILTER	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	3.1	
INITIAL START-UP DATE	9/75	
COMMERCIAL START-UP DATE	6/76	
SO2 DESIGN REMOVAL EFFICIENCY - %	80.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	4.7	(75 GPM)
** DISPOSAL		
TYPE	LINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	100.0			.0			744	0	0	
2/80	SYSTEM	100.0			.0			696	0	0	
3/80	SYSTEM	100.0			.0			744	0	0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER REMAINED OUT OF SERVICE DUE TO BOILER REPAIRS. THE UNIT IS EXPECTED TO BE OPERATING IN MAY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0			.0			720	0	0	.0
5/80	SYSTEM	100.0			.0			744	0	0	.0
6/80	SYSTEM	100.0			.0			720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM REMAINED OFF LINE DURING THE SECOND QUARTER 1980 AS A RESULT OF THE ON-GOING BOILER REPAIRS. COMPLETION OF THE BOILER REPAIRS HAS BEEN DELAYED BY THE UNAVAILABILITY OF SOME NEEDED PARTS.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	LOUISVILLE GAS & ELECTRIC	
PLANT NAME	CANE RUN	
UNIT NUMBER	4	
CITY	LOUISVILLE	
STATE	KENTUCKY	
GROSS UNIT GENERATING CAPACITY - MW	168.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	175.0	
EQUIVALENT SCRUBBED CAPACITY - MW	168.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26749.	(11500 BTU/LB)
AVERAGE ASH CONTENT - %	17.10	
AVERAGE MOISTURE CONTENT - %	9.00	
AVERAGE SULFUR CONTENT - %	3.75	
AVERAGE CHLORIDE CONTENT - %	.04	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	AMERICAN AIR FILTER	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	1.6	
INITIAL START-UP DATE	8/76	
COMMERCIAL START-UP DATE	8/77	
SO2 DESIGN REMOVAL EFFICIENCY - %	85.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	6.3	(100 GPM)
** DISPOSAL		
TYPE	LINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM		100.0		95.6			744	711	711	
2/80	SYSTEM		99.8		66.7			696	465	464	
3/80	SYSTEM		80.5		74.3			744	687	553	

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR OPERATIONAL PROBLEMS WERE REPORTED FOR THE FIRST QUARTER OF 1980 WITH EITHER THE BOILER OR THE FGD SYSTEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	99.0	98.8	98.8	79.9			720	582	575	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL SPRAY PUMP PROBLEMS CAUSED 7 HOURS OF OUTAGE TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	96.8	100.0	100.0	7.0			744	52	52	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS NOT NEEDED MOST OF MAY, THIS ACCOUNTS FOR THE LOW UTILIZATION OF THE FGD UNIT.

ONE DAY OF OUTAGE TIME IN MAY WAS CAUSED BY A LEAK IN A SPRAY PUMP

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------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
                          SEAL.

 6/80  SYSTEM       .0          .0          .0          .0                   720   350      0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          DURING JUNE THE BOILER WAS ON RESERVE, IN WHICH TIME THE SCRUBBER DUCTWORK
                          AND LININGS WERE REPAIRED.

                          SOME OF THE MODULES WERE REPLACED WITH 316 SS DURING THE MONTH.

                          ALSO DURING THE DOWN TIME THE EXPANSION JOINT LOCATED AT THE DISCHARGE
                          OF THE BOOSTER PUMP WAS REPLACED.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	LOUISVILLE GAS & ELECTRIC	
PLANT NAME	CANE RUN	
UNIT NUMBER	5	
CITY	LOUISVILLE	
STATE	KENTUCKY	
GROSS UNIT GENERATING CAPACITY - MW	200.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	192.0	
EQUIVALENT SCRUBBED CAPACITY - MW	200.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26749.	(11500 BTU/LB)
AVERAGE ASH CONTENT - %	17.10	
AVERAGE MOISTURE CONTENT - %	9.00	
AVERAGE SULFUR CONTENT - %	3.75	
AVERAGE CHLORIDE CONTENT - %	.04	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	COMBUSTION ENGINEERING	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	1.5	
INITIAL START-UP DATE	12/77	
COMMERCIAL START-UP DATE	7/78	
SO2 DESIGN REMOVAL EFFICIENCY - %	85.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	POZ-O-TEC	
** DISPOSAL		
TYPE	LINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM		92.1		72.2			744	583	537	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY NO OPERATIONAL PROBLEMS WERE ENCOUNTERED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	SYSTEM		71.9		49.7			696	481	346	
3/80	SYSTEM		44.5		27.2			744	454	202	

** PROBLEMS/SOLUTIONS/COMMENTS

IN FEBRUARY THE UTILITY RAN OUT OF CARBIDE LIME CAUSING INTERRUPTION OF THE FGD SYSTEM OPERATION. THE UNAVAILABILITY OF LIME WAS CAUSED BY FREEZE UPS ENCOUNTERED BY AIRCO, THE LIME SUPPLIER.

REHEATER TUBE PROBLEMS WERE ALSO ENCOUNTERED IN FEBRUARY AND CONTINUED THROUGH MARCH. THE UTILITY HOPES TO REPLACE THE TUBE BUNDLES IN THE SUMMER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	.0	.0	.0	.0			720		0	

LOUISVILLE GAS & ELECTRIC: CANE RUN 5 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS OFF LINE THE ENTIRE MONTH OF APRIL TO INSTALL STAINLESS STEEL IN THE DUCTWORK AND IN THE MODULES.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	95.3	94.5	94.5	80.2			744	632	597	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY ONE DAY OF OUTAGE TIME WAS NECESSARY TO COMPLETE THE INSTALLATION OF THE STAINLESS STEEL IN THE DUCTWORK AND MODULES.

A PUMP SEAL ON THE RECIRCULATION PUMP FAILED CAUSING APPROXIMATELY 10 HOURS OF OUTAGE TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	SYSTEM	78.8	74.4	74.4	61.8			720	598	445	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE THE SYSTEM HAD TO BE TAKEN OFF LINE FOR 153 HOURS DUE TO THE POOR WELDS ON THE TUBE BUNDLES IN THE REHEATER. THE TUBE BUNDLES HAVE BEEN A CONSTANT PROBLEM AND THE MANUFACTURER IS SCHEDULED TO REPLACE THEM IN THE FALL.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	LOUISVILLE GAS & ELECTRIC
PLANT NAME	CANE RUN
UNIT NUMBER	6
CITY	LOUISVILLE
STATE	KENTUCKY
GROSS UNIT GENERATING CAPACITY - MW	299.0
NET UNIT GENERATING CAPACITY W/FGD - MW	277.0
EQUIVALENT SCRUBBED CAPACITY - MW	299.0
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	25586. (11000 BTU/LB)
AVERAGE ASH CONTENT - %	17.10
AVERAGE MOISTURE CONTENT - %	9.00
AVERAGE SULFUR CONTENT - %	4.80
AVERAGE CHLORIDE CONTENT - %	.04
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PROCESS TYPE	DUAL ALKALI
SYSTEM SUPPLIER	ADL/COMBUSTION EQUIP ASSOCIATE
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	1.0
INITIAL START-UP DATE	4/79
COMMERCIAL START-UP DATE	**/**
SO2 DESIGN REMOVAL EFFICIENCY - %	95.00
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00
ABSORBER SPARE CAPACITY INDEX - %	20.0
ABSORBER SPARE COMPONENTS INDEX	.3
** WATER LOOP	
TYPE	CLOSED
FRESH MAKE-UP WATER - LITER/S	******* (***** GPM)
** DISPOSAL	
TYPE	LANDFILL

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM		49.0		13.8			744	210	103	

** PROBLEMS/SOLUTIONS/COMMENTS

FGD SYSTEM OUTAGE TIME IN JANUARY WAS CAUSED BY A THICKENER FAILURE. THE RAKE BECAME INOPERABLE AND THE THICKENER HAD TO BE CLEANED OUT.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	SYSTEM		84.7		47.0			696	386	327	
3/80	SYSTEM	99.9	70.0	99.8	64.5			744	686	460	

** PROBLEMS/SOLUTIONS/COMMENTS

IN FEBRUARY AND MARCH OUTAGE TIME WAS CAUSED BY PROBLEMS WITH THE RECYCLE PUMPS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	98.8	91.6	97.7	73.8			720	580	531	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING AN APRIL BOILER OUTAGE THE SCRUBBER TRAYS WERE CLEANED. (THIS WAS CONSIDERED A FORCED OUTAGE BECAUSE THE UNIT WOULD HAVE HAD TO COME OFF LINE SHORTLY FOR CLEANING).

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	99.6	99.9	99.9	99.5			744	741	740	

LOUISVILLE GAS & ELECTRIC: CANE RUN 6 (CONT.)

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-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                 SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                               DURING MAY THE PRESSURE RELIEF VALVE ON THE BOOSTER FAN MALFUNCTIONED
                               FORCING THE FGD SYSTEM OUT OF SERVICE.

 6/80  SYSTEM      99.9        99.8        99.9        88.9                     720   641    640

       ** PROBLEMS/SOLUTIONS/COMMENTS

                               A SPRAY PUMP MALFUNCTION CAUSED THE SYSTEM TO SHUTDOWN.  APPROXIMATELY
                               ONE HOUR WAS NEEDED TO PUT THE SPARE INTO SERVICE.

                               BOILER TUBES FAILURES WERE ALSO NOTED DURING JUNE.
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                                        SECTION 3
                      DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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 COMPANY NAME                                        LOUISVILLE GAS & ELECTRIC
 PLANT NAME                                          MILL CREEK
 UNIT NUMBER                                         3
 CITY                                                LOUISVILLE
 STATE                                               KENTUCKY
 GROSS UNIT GENERATING CAPACITY - MW                   442.0
 NET UNIT GENERATING CAPACITY W/FGD - MW               420.0
 EQUIVALENT SCRUBBED CAPACITY - MW                     442.0

 ** FUEL DATA
     FUEL TYPE                                       COAL
     FUEL GRADE                                      BITUMINOUS
     AVERAGE HEAT CONTENT - J/G                       26749.          ( 11500 BTU/LB)
     AVERAGE ASH CONTENT - %                             11.50
     AVERAGE MOISTURE CONTENT - %                    ********
     AVERAGE SULFUR CONTENT - %                           3.75
     AVERAGE CHLORIDE CONTENT - %                          .04

 ** GENERAL EMISSION CONTROL SYSTEM DATA
     GENERAL PROCESS TYPE                            WET SCRUBBING
     PROCESS TYPE                                    LIME
     SYSTEM SUPPLIER                                 AMERICAN AIR FILTER
     NEW/RETROFIT                                    NEW
     ENERGY CONSUMPTION - %                               1.6
     INITIAL START-UP DATE                            8/78
     COMMERCIAL START-UP DATE                         3/79
     SO2 DESIGN REMOVAL EFFICIENCY - %                  85.00
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %          99.00
     ABSORBER SPARE CAPACITY INDEX - %                     .0
     ABSORBER SPARE COMPONENTS INDEX                       .0

 ** WATER LOOP
     TYPE                                            OPEN
     FRESH MAKE-UP WATER - LITER/S                        9.4          (  150 GPM)

 ** TREATMENT
     TYPE                                            FLYASH/LIME STABILIZATION

 ** DISPOSAL
     TYPE                                            POND


-----------------------------------------PERFORMANCE DATA------------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  SYSTEM                                            .0                 744      0      0

 2/80  SYSTEM                36.1                      26.6                 696    512    185

 3/80  SYSTEM                36.9                      30.6                 744    618    228

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE UNIT CAME BACK ON LINE ON FEBRUARY 10 AFTER THE TURBINE OVERHAUL
                           WORK WAS COMPLETED.

                           PROBLEMS ENCOUNTERED DURING FEBRUARY AND MARCH WITH THE FGD SYSTEM
                           OPERATION INCLUDED FROZEN WATER LINES AND WORN GASKETS BLOWING IN THE
                           REHEATER FLANGES.

                           THE UTILITY IS IN THE PROCESS OF REPLACING THE REHEATER TUBES.

 4/80  SYSTEM       42.9        42.5        42.5       42.2                 720    715    304
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LOUISVILLE GAS & ELECTRIC: MILL CREEK 3 (CONT.)


------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
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       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE REHEATER TUBE REPLACEMENT CONTINUED INTO APRIL.

                           THE OTHER OUTAGE TIME ENCOUNTERED DURING APRIL WAS CAUSED BY A BLOWN
                           GASKET IN THE CONDENSATE PUMP.

 5/80  SYSTEM      67.5         51.4        51.4        34.4                    744   498    256

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           DURING MAY THE PLASTIC MIST ELIMINATOR COMPONENTS WERE REPLACED WITH
                           STAINLESS STEEL.  THIS KEPT THE SYSTEM OFF LINE FOR APPROXIMATELY 10 DAYS.

                           REHEATER TUBE LEAKS WERE ALSO ENCOUNTERED IN MAY.

 6/80  SYSTEM      88.7           .0          .0          .0                    720    85      0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           IN LATE MAY THE TURBINE LOST TWO BLADES CAUSING THE SYSTEM TO SHUTDOWN
                           UNTIL THE LATTER PART OF JUNE.  DURING THE OUTAGE THE UTILITY DECIDED
                           TO REPLACE THE LIME STORAGE TANK LINES WITH LARGER ONES TO SERVICE THE
                           NEW UNITS.  THE WORK WAS NOT COMPLETED WHEN THE BOILER WAS RETURNED
                           TO SERVICE; THUS, THE FGD UNIT DID NOT OPERATE DURING THE MONTH.
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                                   SECTION 3
              DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
------------------------------------------------------------------------------------------

 COMPANY NAME                                   LOUISVILLE GAS & ELECTRIC
 PLANT NAME                                     PADDY'S RUN
 UNIT NUMBER                                    6
 CITY                                           LOUISVILLE
 STATE                                          KENTUCKY
 GROSS UNIT GENERATING CAPACITY - MW               72.0
 NET UNIT GENERATING CAPACITY W/FGD - MW           67.0
 EQUIVALENT SCRUBBED CAPACITY - MW                 72.0

 ** FUEL DATA
     FUEL TYPE                                  COAL
     FUEL GRADE                                 BITUMINOUS
     AVERAGE HEAT CONTENT - J/G                  26749.        ( 11500 BTU/LB)
     AVERAGE ASH CONTENT - %                       11.50
     AVERAGE MOISTURE CONTENT - %               ********
     AVERAGE SULFUR CONTENT - %                     2.50
     AVERAGE CHLORIDE CONTENT - %               ********

 ** GENERAL EMISSION CONTROL SYSTEM DATA
     GENERAL PROCESS TYPE                       WET SCRUBBING
     PROCESS TYPE                               LIME
     SYSTEM SUPPLIER                            COMBUSTION ENGINEERING
     NEW/RETROFIT                               RETROFIT
     ENERGY CONSUMPTION - %                         2.8
     INITIAL START-UP DATE                       4/73
     COMMERCIAL START-UP DATE                   **/**
     SO2 DESIGN REMOVAL EFFICIENCY - %             90.00
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %     99.10
     ABSORBER SPARE CAPACITY INDEX - %               .0
     ABSORBER SPARE COMPONENTS INDEX                 .0

 ** WATER LOOP
     TYPE                                       CLOSED
     FRESH MAKE-UP WATER - LITER/S                  3.1        (    50 GPM)

 ** TREATMENT
     TYPE                                       LIME STABILIZATION

 ** DISPOSAL
     TYPE                                       POND


-----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  SYSTEM                                           .0                   744     0     0

 2/80  SYSTEM                                           .0                   696     0     0

 3/80  SYSTEM                                           .0                   744     0     0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          THIS UNIT DID NOT OPERATE DURING THE FIRST QUARTER 1980 DUE TO A LACK OF
                          DEMAND.  PADDY'S RUN 6 IS USED AS A PEAKING UNIT AND WILL BE RETIRED
                          SOMETIME IN 1987.

 4/80  SYSTEM     100.0         .0          .0          .0                   720     0     0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          DURING APRIL THE FGD SYSTEM WAS AVAILABLE 100% OF THE TIME BUT WAS NOT
                          OPERATED DUE TO A BOILER RELATED PROBLEM.

 5/80  SYSTEM     100.0       86.6        86.6         7.8                   744    67    58
```

LOUISVILLE GAS & ELECTRIC: PADDY'S RUN 6 (CONT.)

```
-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           DURING MAY 9 HOURS OF OUTAGE TIME RESULTED FROM THE UNAVAILABLITY OF
                           THE LIME SLURRY.

 6/80  SYSTEM     100.0        94.1        94.1        6.7                    720    51    48

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE 3 HOURS THE SCRUBBERS DID NOT OPERATE IN JUNE WAS DUE TO THE FACT
                           THAT THE BOILER WAS BROUGHT ON LINE BEFORE THE SCRUBBER OPERATORS WERE
                           ON DUTY.
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                                     SECTION 3
                  DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
-------------------------------------------------------------------------------------------

 COMPANY NAME                                      MINNESOTA POWER & LIGHT
 PLANT NAME                                        CLAY BOSWELL
 UNIT NUMBER                                       4
 CITY                                              COHASSET
 STATE                                             MINNESOTA
 REGULATORY CLASSIFICATION                         B
 PARTICULATE EMISSION LIMITATION - NG/J              43.          (  .100 LB/MMBTU)
 SO2 EMISSION LIMITATION - NG/J                     516.          ( 1.200 LB/MMBTU)
 NET PLANT GENERATING CAPACITY - MW                1000.0
 GROSS UNIT GENERATING CAPACITY - MW                554.0
 NET UNIT GENERATING CAPACITY W/FGD - MW            504.0
 NET UNIT GENERATING CAPACITY WO/FGD - MW           511.0
 EQUIVALENT SCRUBBED CAPACITY - MW                  475.0

 ** BOILER DATA
     SUPPLIER                                       COMBUSTION ENGINEERING
     TYPE                                           PULVERIZED COAL
     SERVICE LOAD                                   BASE
     COMMERCIAL SERVICE DATE                         2/80
     MAXIMUM BOILER FLUE GAS FLOW - CU.M/S           1086.40       (2302181 ACFM)
     FLUE GAS TEMPERATURE - C                         148.9        ( 300 F)
     STACK HEIGHT - M                                 183.         ( 600 FT)
     STACK TOP DIAMETER - M                            11.3        ( 37.0 FT)

 ** FUEL DATA
     FUEL TYPE                                      COAL
     FUEL GRADE                                     SUBBITUMINOUS
     AVERAGE HEAT CONTENT - J/G                      19276.        (  8287 BTU/LB)
     RANGE HEAT CONTENT - BTU/LB                                     7509 - 9923
     AVERAGE ASH CONTENT - %                            9.40
     RANGE ASH CONTENT - %                          4.81 - 15.99
     AVERAGE MOISTURE CONTENT - %                      24.50
     RANGE MOISTURE CONTENT - %                     20.30 - 28.31
     AVERAGE SULFUR CONTENT - %                          .94
     RANGE SULFUR CONTENT - %                       0 - 4.55
     AVERAGE CHLORIDE CONTENT - %                        .01
     RANGE CHLORIDE CONTENT - %                     0 - 0.07

 ** GENERAL EMISSION CONTROL SYSTEM DATA
     SALEABLE PRODUCT/THROWAWAY PRODUCT             THROWAWAY PRODUCT
     GENERAL PROCESS TYPE                           WET SCRUBBING
     PROCESS TYPE                                   LIME/ALKALINE FLYASH
     PROCESS ADDITIVES                              N/A
     SYSTEM SUPPLIER                                PEABODY PROCESS SYSTEMS
     A-E FIRM                                       EBASCO
     CONSTRUCTION FIRM                              PEABODY PROCESS SYSTEMS
     DEVELOPMENT LEVEL                              FULL SCALE
     NEW/RETROFIT                                   NEW
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %          99.73
     SO2 DESIGN REMOVAL EFFICIENCY - %                  84.60
     INITIAL START-UP                                4/80
     CONSTRUCTION COMPLETION                         2/80
     CONSTRUCTION INITIATION                         5/78
     LETTER OF INTENT SIGNED                         2/77
     STARTED REQUESTING BIDS                         4/76
     STARTED PRELIMINAY DESIGN                       6/75

 ** ESP
     NUMBER                                          2
     TYPE                                           HOT SIDE
     SUPPLIER                                       JOY
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %          99.7
     FLUE GAS CAPACITY - CU.M/S                         94.4        ( 200000 ACFM)
     FLUE GAS TEMPERATURE - C                          398.9        (  750 F)
     PRESSURE DROP - KPA                             *******        (***** IN-H2O)
     PARTICULATE OUTLET LOAD - G/CU.M                    .07        (    .03 GR/SCF)

 ** PARTICULATE SCRUBBER
     NUMBER                                          5
     TYPE                                           RADIAL VENTURI VARIABLE THROAT
     SUPPLIER                                       PEABODY PROCESS SYSTEMS
     NUMBER OF STAGES                                   1
```

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MINNESOTA POWER & LIGHT: CLAY BOSWELL 4 (CONT.)

     SHELL MATERIAL                               STAINLESS STEEL
     LINING MATERIAL                              RUBBER
     INTERNAL MATERIAL                            STAINLESS STEEL
     NUMBER OF NOZZLES                              13
     TYPE OF NOZZLES                              TANGENTIAL AND BULL NOZZLES
     BOILER LOAD/SCRUBBER - %                       33.3
     FLUE GAS CAPACITY - CU.M/S                    394.4          ( 835840 ACFM)
     FLUE GAS TEMPERATURE - C                      148.9          (   300 F)
     LIQUID RECIRCULATION RATE - LITER/S           841.7          (13360 GPM)
     L/G RATIO - LITER/CU.M                          2.7          (20.0 GAL/1000ACF)
     PRESSURE DROP - KPA                         *******          (***** IN-H2O)
     PARTICULATE INLET LOAD - NG/J                5159.           (12.000 LB/MMBTU)
     PARTICULATE OUTLET LOAD - NG/J                 43.           (  .100 LB/MMBTU)
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %      99.7
     SO2 INLET CONCENTRATION - NG/J               2752.           ( 6.400 LB/MMBTU)
     SO2 DESIGN REMOVAL EFFICIENCY - %              89.0

 ** ABSORBER
     NUMBER                                        4
     TYPE                                         VENTURI/SPRAY TOWER
     INITIAL START UP                              5/80
     SUPPLIER                                     PEABODY PROCESS SYSTEMS
     NUMBER OF STAGES                                4
     DIMENSIONS - FT                              DIA 35' HT 60'
     SHELL MATERIAL                               STAINLESS STEEL
     SHELL LINER MATERIAL                         RUBBER AND GLASS REINFORCED POLYESTER
     INTERNAL MATERIAL                            STAINLESS STEEL, CARBON STEEL & RUBBER LINED
     NUMBER OF NOZZLES                              24
     NOZZLE TYPE                                  REFRAX NOZZLES
     BOILER LOAD/ABSORBER - %                       33.3
     GAS FLOW - CU.M/S                             302.08         ( 640130 ACFM)
     GAS TEMPERATURE - C                            53.3          (   128 F)
     LIQUID RECIRCULATION RATE - LITER/S          2104.           (33400 GPM)
     L/G RATIO - L/CU.M                              6.7          ( 50.0 GAL/1000ACF)
     PRESSURE DROP - KPA                             5.0          (20.0 IN-H2O)
     SUPERFICAL GAS VELOCITY - M/SEC                 3.7          ( 12.0 FT/S)
     PARTICULATE INLET LOAD - G/CU.M                  .1          (  .030 GR/SCF)
     PARTICULATE INLET LOAD - NG/J                  43.           (  .100 LB/MMBTU)
     PARTICULATE OUTLET LOAD- G/CU.M                  .1          (  .030 GR/SCF)
     PARTICULATE OUTLET LOAD - NG/J                 43.           (  .100 LB/MMBTU)
     SO2 OUTLET CONTRATION - PPM                   345
     SO2 OUTLET CONCENTRATION- NG/J                               (***** LB/MMBTU)
     SO2 OUTLET CONCENTRATION- NG/J                               (***** LB/MMBTU)
     SO2 DESIGN REMOVAL EFFICIENCY - %              89.0
     ABSORBER SPARE CAPACITY INDEX - %              33.0
     ABSORBER SPARE COMPONENT INDEX                  1.0

 ** FANS
     NUMBER                                        4
     TYPE                                         CENTRIFUGAL RADIAL TIP
     CONSTRUCTION MATERIALS                       INCONEL 625 & INCOLY 825
     SERVICE - WET/DRY                            WET
     CAPACITY - CU.M/S                             320.33         ( 678800 ACFM)

 ** MIST ELIMINATOR
     TYPE                                         RADIAL VANE

 ** MIST ELIMINATOR
     TYPE                                         SIEVE TRAY

 ** MIST ELIMINATOR
     NUMBER                                        4
     TYPE                                         CHEVRON
     CONSTRUCTION MATERIAL                        NORYL
     CONFIGURATION                                HORIZONTAL
     NUMBER OF STAGES                                1
     NUMBER OF PASSES                                3
     FREEBOARD DISTANCE - M                          1.52         ( 5.0 FT)
     DEPTH - M                                        .30         ( 1.0 FT)
     VANE SPACING - CM                               3.5          ( 1.38 IN)
     VANE ANGLES                                  90
     WASH SYSTEM                                  HOSE CONNECTION TO HEADER FOR MANUAL WASH
     SUPERFICIAL GAS VELOCITY - M/S                  3.4          ( 11.0 FT/S)
     PRESSURE DROP - KPA                              .0          (   .0 IN-H2O)

 ** PROCESS CONTROL CHEMISTRY
     CONTROL VARIABLES                            PH-DENSITY IN RECYCLE TANKS
     CONTROL RANGE                                5-6 PH; 7-9% DENSITY
```

MINNESOTA POWER & LIGHT: CLAY BOSWELL 4 (CONT.)

CONTROL MANNER	AUTOMATIC
MODE	FEED BACK
SENSOR LOCATION	RECYCLE TANKS

** PUMPS

SERVICE	NUMBER
ALKALI FEED	2
FLY ASH SLURRY FEED	2
VENTURI RECYCLE	8
ABSORBER RECYCLE	12
WASH WATER	2
QUENCH BOOSTER	1
******	****

** TANKS

SERVICE	NUMBER
RECYCLE	4
ALKALI STORAGE	1
WASH WATER	1
FLY ASH STORAGE	1

** REHEATER

NUMBER	4	
TYPE	BYPASS	
HEATING MEDIUM	HOT FLUE GAS FROM ESP	
TEMPERATURE BOOST - C	14.4	(26 F)

** WATER LOOP

TYPE	CLOSED	
EVAPORATOR WATER LOSS - LITER/S	23.9	(380 GPM)
RECOVERED WATER RETURN - LITER/S	188.1	(2985 GPM)
FRESH MAKEUP WATER ADDITION - LITERS/S	56.4	(895 GPM)

** REAGENT PREPARATION EQUIPMENT

NUMBER OF STORAGE HOPPERS	5	
NUMBER OF SLAKERS	4	
SLAKER CAPACITY - M T/H	.4	(.4 TPH)
REAGENT PRODUCT - % SLURRY SOLIDS	20.0	
POINT OF ADDITION	RECYCLE TANKS	

** DISPOSAL

NATURE	FINAL	
TYPE	LINED POND	
LOCATION	1 MILE WNW OF UNIT	
TRANSPORTATION	PIPE	
DIMENSIONS	4000 x 3000 FT	
AREA - ACRES	300.0	
CAPACITY - CU.M	9556522	(7814.0 ACRE-FT)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER BEGAN OPERATIONS ON FEBRUARY 26, 1980 AND FIRED OIL THROUGH THE MONTH OF MARCH. INITIAL FGD SYSTEM OPERATIONS BEGAN IN EARLY APRIL WITH THE BOILER FIRING COAL FOR TESTING PURPOSES. THE UNIT WAS SHUTDOWN IN MID-APRIL TO RECTIFY MINOR SHAKEDOWN PROBLEMS. A TRIAL RUN OF THE FGD SYSTEM IN AN INTEGRATED MODE OCCURRED IN LATE APRIL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

SHAKEDOWN OPERATIONS CONTINUED THROUGH THE SECOND QUARTER OF 1980. THE FGD SYSTEM WILL BE FINE TUNED TO MEET DESIGN CRITERIA THROUGH JULY. TO DATE THE UTILITY REPORTED THAT, ALTHOUGH MANY TYPICAL STARTUP PROBLEMS

MINNESOTA POWER & LIGHT: CLAY BOSWELL 4 (CONT.)

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-----------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
                                   ATTRIBUTABLE TO OPERATOR ERROR AS WELL AS MECHANICAL MALFUNCTIONS HAVE
                                   OCCURRED, NO UNUSUAL PROBLEMS HAVE OCCURRED.  THE COMPLIANCE TEST IS
                                   SCHEDULED FOR EARLY SEPTEMBER.
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                                        SECTION 3
                  DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
-------------------------------------------------------------------------------------------------

 COMPANY NAME                                      MINNKOTA POWER COOPERATIVE
 PLANT NAME                                        MILTON R. YOUNG
 UNIT NUMBER                                       2
 CITY                                              CENTER
 STATE                                             NORTH DAKOTA
 GROSS UNIT GENERATING CAPACITY - MW                 440.0
 NET UNIT GENERATING CAPACITY W/FGD - MW             402.0
 EQUIVALENT SCRUBBED CAPACITY - MW                   185.0

 ** FUEL DATA
    FUEL TYPE                                      COAL
    FUEL GRADE                                     LIGNITE
    AVERAGE HEAT CONTENT - J/G                      15119.        (  6500 BTU/LB)
    AVERAGE ASH CONTENT - %                             6.50
    AVERAGE MOISTURE CONTENT - %                       38.00
    AVERAGE SULFUR CONTENT - %                           .70
    AVERAGE CHLORIDE CONTENT - %                         .01

 ** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                           WET SCRUBBING
    PROCESS TYPE                                   LIME/ALKALINE FLYASH
    SYSTEM SUPPLIER                                ADL/COMBUSTION EQUIP ASSOCIATE
    NEW/RETROFIT                                   NEW
    ENERGY CONSUMPTION - %                              1.6
    INITIAL START-UP DATE                           9/77
    COMMERCIAL START-UP DATE                        6/78
    SO2 DESIGN REMOVAL EFFICIENCY - %                  75.00
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %          99.60
    ABSORBER SPARE CAPACITY INDEX - %                 100.0
    ABSORBER SPARE COMPONENTS INDEX                     1.0

 ** WATER LOOP
    TYPE                                           CLOSED
    FRESH MAKE-UP WATER - LITER/S                      44.1        (  700 GPM)

 ** DISPOSAL
    TYPE                                           MINEFILL


-----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  A            67.7        10.5                     7.1
       B            67.7          .0                      .0
       SYSTEM        7.1        10.5        10.5         7.1                 744    504     27

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          DURING JANUARY THE COLD WEATHER CAUSED SOME PIPE LINES AND THE BOOSTER
                          FAN TO FREEZE.

                          A HIGH PERCENTAGE OF COARSE SOLIDS IN THE THICKENER CAUSED SOME OUTAGE
                          TIME.  THE WORM GEAR ON THE THICKENER FAILED ADDING TO THE OUTAGE TIME.

 2/80  A              .0          .0                      .0
       B              .0          .0                      .0
       SYSTEM         .0          .0                      .0                 696    696      0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          PROBLEMS RELATED TO THE COLD WEATHER CONTINUED THROUGH FEBRUARY.  ICE
                          ON THE BOOSTER FAN HAD TO BE MELTED.

                          SHAFT SLEEVES ON SEVERAL SPRAY RECYCLE PUMPS WERE REPLACED.

                          THE GEAR REDUCER FAILED ON THE B-SIDE ABSORBER AGITATOR CAUSING PROBLEMS.
```

MINNKOTA POWER COOPERATIVE: MILTON R. YOUNG 2 (CONT.)

PERFORMANCE DATA

THE ISOLATION DAMPER CHAINS BROKE DURING THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	A	25.9	22.6		22.6						
	B	28.9	6.2		6.2						
	SYSTEM	28.9	28.8	28.8	28.8			744	743	107	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH COLD WEATHER CONTINUED TO BE A PROBLEM.

THE TORQUE SWITCHES ON THE ISOLATION DAMPERS WERE REPLACED. THE DAMPER PROBLEMS CAUSED THE BOOSTER FAN TO TRIP.

AN EXCESSIVE AMOUNT OF COARSE PARTICLES IN THE THICKENER CONTINUED TO BE A PROBLEM. PLUGGED BLEED LINES FROM THE ABSORBER TO THE THICKENER WERE ALSO ENCOUNTERED.

THE A-SIDE ABSORBER AGITATOR EXPERIENCED A PROBLEM WITH THE ANCHOR BOLTS SHEARING.

THE SHAFT SLEEVES ON THE SPRAY RECYCLE PUMPS WOULD NOT HOLD THE PACKING SO THEY HAD TO BE REPLACED IN MARCH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	A	100.0	.0		.0						
	B	.0	.0	.0	.0						
	SYSTEM	.0	.0	.0	.0			720	154	0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN FOR APPROXIMATELY 3 WEEKS FOR THE ANNUAL UNIT OUTAGE DURING APRIL.

PLUGGED BLEED LINES AND THE REPLACEMENT OF THE SHAFT SLEEVES ON THE RECYCLE PUMPS CAUSED THE FGD SYSTEM TO REMAIN OFF LINE DURING THE TIME THE BOILER OPERATED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	A	.0	.0		.0						
	B	47.2	48.4	50.6	45.6						
	SYSTEM	47.2	48.4	50.6	45.6			744	700	339	

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE B WAS OPERATED DURING MAY WHILE REPAIR WORK WAS BEING DONE ON MODULE A.

THE REPAIRS ON MODULE A INCLUDED WORK ON THE SPRAY RECYCLE NOZZLES PIPING, AND THE RECYCLE HEADER.

THE VALVES ON BOTH THE SPRAY RECYCLE PUMP AND THE DISCHARGE SPRAY CYCLE PUMP WERE REPAIRED.

THE ABSORBER LINING HAS STARTED TO WEAR AND IS NOW BEING REPAIRED.

LARGE SOLIDS PLUGGED THE THICKNER LINES. HIGH SOLIDS ALSO CAUSED PROBLEMS WITH THE RAKE AND CONE. BOTH THE THICKNER AND THE CLARIFIER HAD TO BE DRAINED AND CLEANED.

THE ABSORBER AGITATOR TUNNEL WAS ALSO CLEANED DURING THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	A	100.0	.0		.0						
	B	41.8	40.4	41.4	39.3						
	SYSTEM	41.8	40.4	41.4	39.3			720	701	283	

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE B CONTINUED TO OPERATE THROUGH JUNE.

PROBLEMS WITH THE THICKNER CONTINUED THROUGH THE MONTH. HIGH SOLIDS CAUSED PROBLEMS WITH THE RAKE MECHANISM AND THE LIMIT SWITCH.

```
-------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
                                         TROUBLE WAS ENCOUNTERED DURING JUNE WITH THE VACUUM FILTER.

                                         THE REPAIR WORK CONTINUED ON THE ABSORBER FLAKE LINING.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

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COMPANY NAME                                        MONONGAHELA POWER
PLANT NAME                                          PLEASANTS
UNIT NUMBER                                         1
CITY                                                BELMONT
STATE                                               WEST VIRGINIA
GROSS UNIT GENERATING CAPACITY - MW                   618.0
NET UNIT GENERATING CAPACITY W/FGD - MW               580.0
EQUIVALENT SCRUBBED CAPACITY - MW                     618.0

** FUEL DATA
    FUEL TYPE                                       COAL
    FUEL GRADE                                      BITUMINOUS
    AVERAGE HEAT CONTENT - J/G                       27912.        ( 12000 BTU/LB)
    AVERAGE ASH CONTENT - %                         ********
    AVERAGE MOISTURE CONTENT - %                       15.00
    AVERAGE SULFUR CONTENT - %                          3.70
    AVERAGE CHLORIDE CONTENT - %                    ********

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                            WET SCRUBBING
    PROCESS TYPE                                    LIME
    SYSTEM SUPPLIER                                 BABCOCK & WILCOX
    NEW/RETROFIT                                    NEW
    ENERGY CONSUMPTION - %                          *******
    INITIAL START-UP DATE                            3/79
    COMMERCIAL START-UP DATE                        **/**
    SO2 DESIGN REMOVAL EFFICIENCY - %                  90.00
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %          99.55
    ABSORBER SPARE CAPACITY INDEX - %                    .0
    ABSORBER SPARE COMPONENTS INDEX                      .0

** WATER LOOP
    TYPE                                            CLOSED
    FRESH MAKE-UP WATER - LITER/S                   *******        (***** GPM)


------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------

 1/80  SYSTEM                                                               744

 2/80  SYSTEM                                                               690

 3/80  SYSTEM                                                               744

      ** PROBLEMS/SOLUTIONS/COMMENTS

                            NO INFORMATION WAS AVAILABLE ON THE OPERATIONS AT PLEASANTS 1 FOR THE
                            FIRST QUARTER 1980.

 4/80  SYSTEM                                                               720

 5/80  SYSTEM                                                               744

 6/80  SYSTEM                                                               720

      ** PROBLEMS/SOLUTIONS/COMMENTS

                            INFORMATION WAS UNAVAILABLE FOR THE SECOND QUARTER 1980 REPORT PERIOD.
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                                          SECTION 3
                  DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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  COMPANY NAME                                        MONTANA POWER
  PLANT NAME                                          COLSTRIP
  UNIT NUMBER                                         1
  CITY                                                COLSTRIP
  STATE                                               MONTANA
  GROSS UNIT GENERATING CAPACITY - MW                   360.0
  NET UNIT GENERATING CAPACITY W/FGD - MW               332.0
  EQUIVALENT SCRUBBED CAPACITY - MW                     360.0

  ** FUEL DATA
     FUEL TYPE                                        COAL
     FUEL GRADE                                       SUBBITUMINOUS
     AVERAGE HEAT CONTENT - J/G                        20569.        (  8843 BTU/LB)
     AVERAGE ASH CONTENT - %                               8.60
     AVERAGE MOISTURE CONTENT - %                         23.90
     AVERAGE SULFUR CONTENT - %                             .77
     AVERAGE CHLORIDE CONTENT - %                           .01

  ** GENERAL EMISSION CONTROL SYSTEM DATA
     GENERAL PROCESS TYPE                             WET SCRUBBING
     PROCESS TYPE                                     LIME/ALKALINE FLYASH
     SYSTEM SUPPLIER                                  ADL/COMBUSTION EQUIP ASSOCIATE
     NEW/RETROFIT                                     NEW
     ENERGY CONSUMPTION - %                               3.3
     INITIAL START-UP DATE                             9/75
     COMMERCIAL START-UP DATE                         11/75
     SO2 DESIGN REMOVAL EFFICIENCY - %                   60.00
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %           99.50
     ABSORBER SPARE CAPACITY INDEX - %                   20.0
     ABSORBER SPARE COMPONENTS INDEX                        .5

  ** WATER LOOP
     TYPE                                             CLOSED
     FRESH MAKE-UP WATER - LITER/S                       23.3          (  370 GPM)

  ** DISPOSAL
     TYPE                                             POND


-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL    PER   BOILER  FGD    CAP.
                                                               SO2  PART.  HOURS  HOURS  HOURS  FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- -----  -----  ------ -----  ------

12/79  SYSTEM       95.9                                                     744

 1/80  SYSTEM       96.5                                                     744

 2/80  SYSTEM       97.4                                                     696

 3/80  SYSTEM       95.4                                                     744

        ** PROBLEMS/SOLUTIONS/COMMENTS

                         TOTAL SYSTEM AVAILABILITY CONTINUES TO BE HIGH WITH NO MAJOR FGD SYSTEM
                         PROBLEMS REPORTED DURING THE FIRST QUARTER OF 1980.

 4/80  SYSTEM                                                                720

 5/80  SYSTEM                                                                744

 6/80  SYSTEM                                                                720

        ** PROBLEMS/SOLUTIONS/COMMENTS

                         INFORMATION FOR THE APRIL THROUGH JUNE PERIOD WAS NOT AVAILABLE.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	MONTANA POWER	
PLANT NAME	COLSTRIP	
UNIT NUMBER	2	
CITY	COLSTRIP	
STATE	MONTANA	
GROSS UNIT GENERATING CAPACITY - MW	360.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	332.0	
EQUIVALENT SCRUBBED CAPACITY - MW	360.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	20569.	(8843 BTU/LB)
AVERAGE ASH CONTENT - %	8.60	
AVERAGE MOISTURE CONTENT - %	23.90	
AVERAGE SULFUR CONTENT - %	.77	
AVERAGE CHLORIDE CONTENT - %	.01	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME/ALKALINE FLYASH	
SYSTEM SUPPLIER	ADL/COMBUSTION EQUIP ASSOCIATE	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	3.3	
INITIAL START-UP DATE	5/76	
COMMERCIAL START-UP DATE	10/76	
SO2 DESIGN REMOVAL EFFICIENCY - %	60.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50	
ABSORBER SPARE CAPACITY INDEX - %	20.0	
ABSORBER SPARE COMPONENTS INDEX	.5	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	23.3	(370 GPM)
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/79	SYSTEM	95.8						744			
1/80	SYSTEM	92.7						744			
2/80	SYSTEM	98.1						696			
3/80	SYSTEM	98.2						744			

** PROBLEMS/SOLUTIONS/COMMENTS

TOTAL SYSTEM AVAILABILITY CONTINUES TO BE HIGH WITH NO MAJOR PROBLEMS REPORTED WITH THE FGD SYSTEM FOR THE FIRST QUARTER OF 1980.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION FOR THE APRIL THROUGH JUNE PERIOD WAS NOT AVAILABLE.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	NEVADA POWER	
PLANT NAME	REID GARDNER	
UNIT NUMBER	1	
CITY	MOAPA	
STATE	NEVADA	
GROSS UNIT GENERATING CAPACITY - MW	125.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	110.0	
EQUIVALENT SCRUBBED CAPACITY - MW	125.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	28959.	(12450 BTU/LB)
AVERAGE ASH CONTENT - %	8.00	
AVERAGE MOISTURE CONTENT - %	5.50	
AVERAGE SULFUR CONTENT - %	.50	
AVERAGE CHLORIDE CONTENT - %	.05	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	SODIUM CARBONATE	
SYSTEM SUPPLIER	ADL/COMBUSTION EQUIP ASSOCIATE	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	4/74	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	90.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	97.00	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	9.8	(155 GPM)
** DISPOSAL		
TYPE	LINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	100.0	100.0	100.0	100.0			744	744	744	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER AND FGD SYSTEM OPERATED THE ENTIRE MONTH WITH NO OUTAGES.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	SYSTEM	100.0	100.0	100.0	100.0			696	696	696	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY, NO OUTAGES OCCURRED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	SYSTEM	66.2	83.7	84.7	33.8			744	300	251	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST OF MARCH THE FGD SYSTEM WAS OFF LINE FOR A SCHEDULED OVERHAUL.

THE FGD UNIT WAS FORCED OUT OF SERVICE ONCE TO REPAIR THE VENTURI PUMP AND SIX OTHER TIMES DUE TO LOW VENTURI FLOW.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	97.2	96.7	96.7	81.0			720	603	583	

NEVADA POWER: REID GARDNER 1 (CONT.)

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-------------------------------------------PERFORMANCE DATA--------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD    CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             LEAKS IN THE VENTURI LINE FORCED THE FGD SYSTEM OUT OF SERICE TWICE
                             DURING APRIL.

                             A THERMOCOUPLE SHORTED OUT DUE TO HIGH VENTURI GAS OUTLET TEMPERATURES.
                             THIS FORCED THE FGD SYSTEM OUT OF SERVICE FOR SEVERAL HOURS.

                             THE BOILER WAS OUT OF SERVICE FOR 117 HOURS DUE TO BOILER TUBE LEAKS.

 5/80  SYSTEM      97.7        93.9        97.4        84.7                         744   672    630

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             THE FGD SYSTEM WAS DOWN THREE TIMES IN MAY BECAUSE OF LOW FLOW THROUGH THE
                             VENTURI.

                             A BOILER TRIP CAUSED THE FGD SYSTEM TO BE OUT APPROXIMATELY 97 HOURS.

 6/80  SYSTEM      92.6        93.3        93.3        88.8                         720   686    639

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             THE NOZZLES IN THE VENTURI RACE TRACK HAD TO BE CLEANED SEVERAL TIMES THIS
                             MONTH.  TOTAL OUTAGE FOR THIS WAS APPROXIMATELY 48 HOURS.

                             THE FGD SYSTEM WAS FORCED OUT OF SERVICE WHEN THE EMERGENCY SPRAY SYSTEM
                             FAILED.

                             THE FGD SYSTEM WAS OUT OF SERVICE TWICE DURING JUNE DUE TO BOILER OUTAGES.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	NEVADA POWER	
PLANT NAME	REID GARDNER	
UNIT NUMBER	2	
CITY	MOAPA	
STATE	NEVADA	
GROSS UNIT GENERATING CAPACITY - MW	125.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	110.0	
EQUIVALENT SCRUBBED CAPACITY - MW	125.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	28959.	(12450 BTU/LB)
AVERAGE ASH CONTENT - %	8.00	
AVERAGE MOISTURE CONTENT - %	5.50	
AVERAGE SULFUR CONTENT - %	.50	
AVERAGE CHLORIDE CONTENT - %	.05	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	SODIUM CARBONATE	
SYSTEM SUPPLIER	ADL/COMBUSTION EQUIP ASSOCIATE	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	4/74	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	90.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	97.00	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	9.8	(155 GPM)
** DISPOSAL		
TYPE	LINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	97.3	96.9	96.9	81.6			744	627	607	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE SCRUBBER WENT OFF LINE WITH THE BOILER TO REPLACE THE REBUILT BOILER HIGH PRESSURE HEATER. THIS OUTAGE LASTED APPROXIMATELY 112 HOURS.

REPAIRS WERE NEEDED ON THE LEFT HAND INTERCEPT VALVE ON THE TURBINE CAUSING THE SCRUBBER TO COME OFF LINE WITH THE BOILER.

THE CLEANING OF THE VENTURI RACE TRACK NOZZLES CAUSED TWO SCRUBBER OUTAGES.

THE SCRUBBER WENT OFF LINE SO MAINTENANCE COULD BE PERFORMED ON THE ID FAN DAMPER CONTROLS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	SYSTEM	97.0	97.0	97.0	97.0			696	696	675	

** PROBLEMS/SOLUTIONS/COMMENTS

THE SCRUBBER WAS TAKEN OFF-LINE TWICE DURING FEBRUARY DUE TO A MALFUNCTION OF THE ID FAN CONTROLS. THE PRESSURE SENSING LINES WERE ALSO CLEANED DURING THE OUTAGE.

THE SCRUBBER RACE TRACK NOZZLES HAD TO BE CLEANED TWICE, CAUSING APPROX-

NEVADA POWER: REID GARDNER 2 (CONT.)

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------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
                                  IMATELY 4 HOURS OUTAGE TIME.

                                  THE DISCHARGE VALVE ON THE VENTURI RECYCLE PUMP WAS REPLACED DURING
                                  FEBRUARY.

                                  REPAIRS WERE MADE ON THE SCRUBBER EMERGENCY SPRAY LINE CAUSING ABOUT 4
                                  HOURS OUTAGE TIME.

                                  THE SCRUBBER HAD TO BE SHUT DOWN SO REPAIRS ON THE ID FAN DAMPER CONTROLS
                                  COULD BE MADE.

 3/80  SYSTEM      97.5         97.5        97.5        97.5                    744   744    725

        ** PROBLEMS/SOLUTIONS/COMMENTS

                                  DURING MARCH THE SCRUBBER WAS TAKEN OFF LINE DUE TO THE UNAVAILABILITY OF
                                  THE EMERGENCY SPRAY SYSTEM.  DURING THIS TIME MAINTENANCE WAS DONE ON THE
                                  A AND B ASH SLUICE PUMPS.

                                  LATER IN THE MONTH AN OUTAGE WAS CAUSED BY A LEAK IN THE EMERGENCY SPRAY
                                  LINE.

                                  LOW VENTURI FLOW ALSO WAS A PROBLEM DURING MARCH.

 4/80  SYSTEM      99.0         99.0        99.0        93.5                    720   680    673

        ** PROBLEMS/SOLUTIONS/COMMENTS

                                  THE FGD SYSTEM WAS UNAVAILABLE FOR 7 HOURS TO UNPLUG THE VENTURI RACE
                                  TRACK.

                                  THE BOILER WAS OUT OF SERVICE FOR 40 HOURS DUE TO BOILER TUBE LEAKS.

 5/80  SYSTEM      93.3         85.5        68.1        14.2                    744   124    106

        ** PROBLEMS/SOLUTIONS/COMMENTS

                                  THE FGD OVERHAUL WAS COMPLETED EARLY IN MAY.

                                  A BOILER OVERHAUL WAS STARTED AND COMPLETED DURING MAY.  THIS OUTAGE LASTED
                                  ALMOST 23 DAYS.

 6/80  SYSTEM      99.6         97.5        99.5        75.2                    720   541    528

        ** PROBLEMS/SOLUTIONS/COMMENTS

                                  THE BOILER WAS OUT OF SERVICE SEVERAL TIMES DURING JUNE.  THIS CAUSED THE
                                  FGD SYSTEM TO BE OUT APPROXIMATELY 80 HOURS.

                                  VENTURI RACE TRACK NOZZLES NEEDED TO BE UNPLUGGED CAUSING THE FGD SYSTEM
                                  OUT OF SERVICE FOR SEVERAL HOURS.
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                                              SECTION 3
                  DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
-------------------------------------------------------------------------------------------------

 COMPANY NAME                                           NEVADA POWER
 PLANT NAME                                             REID GARDNER
 UNIT NUMBER                                            3
 CITY                                                   MOAPA
 STATE                                                  NEVADA
 GROSS UNIT GENERATING CAPACITY - MW                      125.0
 NET UNIT GENERATING CAPACITY W/FGD - MW                  110.0
 EQUIVALENT SCRUBBED CAPACITY - MW                        125.0

** FUEL DATA
    FUEL TYPE                                           COAL
    FUEL GRADE                                          BITUMINOUS
    AVERAGE HEAT CONTENT - J/G                           28959.        ( 12450 BTU/LB)
    AVERAGE ASH CONTENT - %                                 8.00
    AVERAGE MOISTURE CONTENT - %                            9.00
    AVERAGE SULFUR CONTENT - %                               .50
    AVERAGE CHLORIDE CONTENT - %                             .05

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                                WET SCRUBBING
    PROCESS TYPE                                        SODIUM CARBONATE
    SYSTEM SUPPLIER                                     ADL/COMBUSTION EQUIP ASSOCIATE
    NEW/RETROFIT                                        NEW
    ENERGY CONSUMPTION - %                              *******
    INITIAL START-UP DATE                                6/76
    COMMERCIAL START-UP DATE                             7/76
    SO2 DESIGN REMOVAL EFFICIENCY - %                      85.00
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %              99.00
    ABSORBER SPARE CAPACITY INDEX - %                        .0
    ABSORBER SPARE COMPONENTS INDEX                          .0

** WATER LOOP
    TYPE                                                CLOSED
    FRESH MAKE-UP WATER - LITER/S                           9.8        (  155 GPM)

** DISPOSAL
    TYPE                                                LINED POND


---------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  SYSTEM     100.0        99.7       100.0        91.3                  744   681    679

      ** PROBLEMS/SOLUTIONS/COMMENTS

                          DURING JANUARY THE SCRUBBER AND BOILER WERE OFF LINE FOR APPROXIMATELY
                          64 HOURS TO REPAIR AND BALANCE THE BOILER ID FAN.

 2/80  SYSTEM      78.8        98.2        77.9        77.9                  696   552    542

      ** PROBLEMS/SOLUTIONS/COMMENTS

                          DURING FEBRUARY TWO OUTAGES WERE NECESSARY SO THE ID FAN COULD BE BALANCED.

                          THE SCRUBBER AND BOILER WENT OFF LINE SO THAT THE COAL LEAKS ON THE
                          BURNER LINES COULD BE REPAIRED.

                          HIGH FURNACE PRESSURE CAUSED THE SCRUBBER AND BOILER TO TRIP OFF.

 3/80  SYSTEM      60.3        99.7        99.7        60.3                  744   450    448

      ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE UNIT AND SCRUBBER WENT DOWN TWICE DURING MARCH.  THE FIRST OUTAGE WAS
                          TO BALANCE THE ID FAN.  LATER IN THE MONTH THE ID FANS AND THE
                          PRECIPITATORS HAD TO BE REPAIRED.
```

NEVADA POWER: REID GARDNER 3 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR
4/80	SYSTEM	100.0			.0			720	0	0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS AVAILABLE 100% DURING APRIL, HOWEVER, DID NOT OPERATE DUE TO THE OVERHAUL OF BOTH THE DUST COLLECTOR AND THE ID FAN.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR
5/80	SYSTEM	.0	.0	.0	.0			744	462	0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS DOWN THE ENTIRE MONTH FOR THE OVERHAUL OF THE FGD ID FANS. BECAUSE OF THIS, THE SYSTEM AVAILABILITY WAS ZERO FOR MAY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR
6/80	SYSTEM	75.2	81.4	81.4	72.2			720	639	520	

** PROBLEMS/SOLUTIONS/COMMENTS

THE ID FAN OVERHAUL WAS COMPLETED EARLY IN JUNE.

THE BOILER WAS OUT OF SERVICE FOR 21 HOURS.

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EPA UTILITY FGD SURVEY: APRIL - JUNE 1980

                                      SECTION 3
                   DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
--------------------------------------------------------------------------------------------------------

  COMPANY NAME                                      NORTHERN INDIANA PUB SERVICE
  PLANT NAME                                        DEAN H. MITCHELL
  UNIT NUMBER                                       11
  CITY                                              GARY
  STATE                                             INDIANA
  GROSS UNIT GENERATING CAPACITY - MW                 115.0
  NET UNIT GENERATING CAPACITY W/FGD - MW              78.0
  EQUIVALENT SCRUBBED CAPACITY - MW                   115.0

  ** FUEL DATA
      FUEL TYPE                                     COAL
      FUEL GRADE                                    ******
      AVERAGE HEAT CONTENT - J/G                     25586.        ( 11000 BTU/LB)
      AVERAGE ASH CONTENT - %                       ********
      AVERAGE MOISTURE CONTENT - %                     11.00
      AVERAGE SULFUR CONTENT - %                        3.50
      AVERAGE CHLORIDE CONTENT - %                  ********

  ** GENERAL EMISSION CONTROL SYSTEM DATA
      GENERAL PROCESS TYPE                          WET SCRUBBING
      PROCESS TYPE                                  WELLMAN LORD
      SYSTEM SUPPLIER                               DAVY MCKEE
      NEW/RETROFIT                                  RETROFIT
      ENERGY CONSUMPTION - %                           27.8
      INITIAL START-UP DATE                          7/76
      COMMERCIAL START-UP DATE                       6/77
      SO2 DESIGN REMOVAL EFFICIENCY - %                90.00
      PARTICULATE DESIGN REMOVAL EFFICIENCY - %        98.50
      ABSORBER SPARE CAPACITY INDEX - %                  .0
      ABSORBER SPARE COMPONENTS INDEX                    .0

  ** WATER LOOP
      TYPE                                          CLOSED
      FRESH MAKE-UP WATER - LITER/S                 *******         (***** GPM)

  ** BYPRODUCT
      BYPRODUCT NATURE                              ELEMENTAL SULFUR
      DISPOSITION


---------------------------------------PERFORMANCE DATA--------------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

12/79  SYSTEM        .0                                 .0                  744     0     0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE TURNAROUND ON UNIT 11 WAS COMPLETED ON DECEMBER 14, HOWEVER, THE STEAM
                           SUPPLY TO THE REGENERATION FACILITY WAS NOT AVAILABLE IN DECEMBER.  THE
                           FGD SYSTEM DID NOT OPERATE THE ENTIRE MONTH.

 1/80  SYSTEM      17.3                                 .0                  744     0     0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE STEAM SUPPLY TO THE REGENERATION FACILITY WAS MADE AVAILABLE ON
                           JANUARY 15.  THE FGD SYSTEM WAS OPERATIONAL ON JANUARY 22 AFTER THE
                           OVERHAUL OF THE BOOSTER BLOWER DRIVE WAS COMPLETED.

                           THE REGENERATION FACILITY WAS FORCED OUT SEVERAL TIMES DUE TO PROBLEMS
                           WITH THE CONDENSATE RETURN.

 2/80  SYSTEM      46.3         27.0        26.5        23.3                696   600   162
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NORTHERN INDIANA PUB SERVICE: DEAN H. MITCHELL 11 (CONT.)


------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE BOILER WAS SHUT DOWN ON FEBRUARY 27 DUE TO A HYDROGEN LEAK.

                         THE FGD SYSTEM WAS FORCED OUT DUE TO CONTINUED PROBLEMS WITH THE CONDENSATE
                         RETURN.  GAS LEAKS IN THE FLUE AND VESSEL SHELL IN THE SO2 REDUCTION UNIT
                         ALSO CAUSED THE SYSTEM TO GO DOWN.

 3/80  SYSTEM      75.4        20.4        24.9        14.5                   744   529    108

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE BOILER WAS OPERATIONAL ON MARCH 1 AFTER THE HYDROGEN LEAKS WERE
                         REPAIRED.  THE BOILER WAS DOWN FROM MARCH 18 TO 23 SO THAT THE TURBINE
                         STOP VALVES COULD BE PULLED AND THE HYDROGEN SEALS COULD BE INSPECTED.

                         THE FGD SYSTEM WAS FORCED OUT OF SERVICE WHEN A COMPRESSOR FAILED AND
                         AGAIN LATER AFTER AN INSTRUMENT MALFUNCTION.  THERE WAS A COMPLETE POWER
                         IN THE FGD AREA WHICH FORCED THE SYSTEM DOWN FROM MARCH 26 THROUGH 27.

 4/80  SYSTEM      63.3        52.6        53.4        50.3                   720   702    362

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         FGD SYSTEM OPERATIONS DURING APRIL WERE INTERRUPTED BY SULFUR ACCUMULA-
                         TION AND BLOCKAGE IN THE CLAUS CONVERTER UNIT.

 5/80  SYSTEM      62.8        23.5        26.4        15.5                   744   490    115

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE FGD SYSTEM REGENERATION FACILITY EXPERIENCED A DRIVE MOTOR FAILURE ON
                         THE EVAPORATOR CIRCULATING PUMP DURING MAY.

 6/80  SYSTEM      53.3          .0          .0          .0                   720   211      0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE BOILER WAS OFF LINE MOST OF JUNE DUE TO LOW SYSTEM POWER DEMAND.

                         THE AVAILABILITY OF THE FGD SYSTEM WAS LIMITED BY PROBLEMS WITH THE
                         BOOSTER BLOWER DRIVE AND LOOSENING OF A SUPPORT BEAM IN THE ABSORBER.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	NORTHERN STATES POWER
PLANT NAME	SHERBURNE
UNIT NUMBER	1
CITY	BECKER
STATE	MINNESOTA
GROSS UNIT GENERATING CAPACITY - MW	740.0
NET UNIT GENERATING CAPACITY W/FGD - MW	700.0
EQUIVALENT SCRUBBED CAPACITY - MW	740.0
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	19771. (8500 BTU/LB)
AVERAGE ASH CONTENT - %	9.00
AVERAGE MOISTURE CONTENT - %	25.00
AVERAGE SULFUR CONTENT - %	.80
AVERAGE CHLORIDE CONTENT - %	.03
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PROCESS TYPE	LIMESTONE/ALKALINE FLYASH
SYSTEM SUPPLIER	COMBUSTION ENGINEERING
NEW/RETROFIT	NEW
ENERGY CONSUMPTION - %	2.7
INITIAL START-UP DATE	3/76
COMMERCIAL START-UP DATE	5/76
SO2 DESIGN REMOVAL EFFICIENCY - %	50.00
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00
ABSORBER SPARE CAPACITY INDEX - %	9.0
ABSORBER SPARE COMPONENTS INDEX	1.0
** WATER LOOP	
TYPE	CLOSED
FRESH MAKE-UP WATER - LITER/S	******* (***** GPM)
** TREATMENT	
TYPE	FORCED OXIDATION
** DISPOSAL	
TYPE	LINED POND

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	97.0						744	793		
2/80	SYSTEM	97.0						696	687		
3/80	SYSTEM	98.0						744	688		

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER OF 1980 NO MAJOR PROBLEMS WERE ENCOUNTERED WITH THE FGD UNIT.

FROM MID-SEPTEMBER TO MID-OCTOBER THE UTILITY HAS SCHEDULED A BOILER OUTAGE AT WHICH TIME THE MARBLE BEDS WILL BE INSPECTED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	97.0						720	720		79.4
5/80	SYSTEM	96.0						744	720		78.1
6/80	SYSTEM	96.0						720	697		74.7

NORTHERN STATES POWER: SHERBURNE 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR OPERATIONAL PROBLEMS WERE REPORTED DURING THE SECOND QUARTER OF 1980.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	NORTHERN STATES POWER
PLANT NAME	SHERBURNE
UNIT NUMBER	2
CITY	BECKER
STATE	MINNESOTA
GROSS UNIT GENERATING CAPACITY - MW	740.0
NET UNIT GENERATING CAPACITY W/FGD - MW	720.0
EQUIVALENT SCRUBBED CAPACITY - MW	740.0

**** FUEL DATA**

FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	19771.	(8500 BTU/LB)
AVERAGE ASH CONTENT - %	9.00	
AVERAGE MOISTURE CONTENT - %	25.00	
AVERAGE SULFUR CONTENT - %	.80	
AVERAGE CHLORIDE CONTENT - %	.03	

**** GENERAL EMISSION CONTROL SYSTEM DATA**

GENERAL PROCESS TYPE	WET SCRUBBING
PROCESS TYPE	LIMESTONE/ALKALINE FLYASH
SYSTEM SUPPLIER	COMBUSTION ENGINEERING
NEW/RETROFIT	NEW
ENERGY CONSUMPTION - %	2.7
INITIAL START-UP DATE	4/77
COMMERCIAL START-UP DATE	4/77
SO2 DESIGN REMOVAL EFFICIENCY - %	50.00
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00
ABSORBER SPARE CAPACITY INDEX - %	9.0
ABSORBER SPARE COMPONENTS INDEX	1.0

**** WATER LOOP**

TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)

**** TREATMENT**

TYPE	FORCED OXIDATION

**** DISPOSAL**

TYPE	LINED POND

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	97.0						744	744		
2/80	SYSTEM	96.0						696	696		
3/80	SYSTEM	98.0						744	744		

**** PROBLEMS/SOLUTIONS/COMMENTS**

DURING THE FIRST QUARTER OF 1980 THE FGD SYSTEM EXPERIENCED NO MAJOR PROBLEMS.

A FOUR WEEK BOILER OUTAGE IS SCHEDULED FOR MAY AT WHICH TIME THE MARBLE BEDS WILL BE REMOVED FROM THE FGD UNIT.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	96.0						720	704		68.6

**** PROBLEMS/SOLUTIONS/COMMENTS**

NO MAJOR OPERATIONAL PROBLEMS WERE ENCOUNTERED IN APRIL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	96.0						744	214		24.2
6/80	SYSTEM	100.0						720	51		2.8

NORTHERN STATES POWER: SHERBURNE 2 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS OUT OF SERIVE MOST OF MAY AND JUNE BECAUSE OF THE ANNUAL BOILER AND TURBINE INSPECTION.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	PACIFIC POWER & LIGHT	
PLANT NAME	JIM BRIDGER	
UNIT NUMBER	4	
CITY	ROCK SPRINGS	
STATE	WYOMING	
GROSS UNIT GENERATING CAPACITY - MW	550.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	507.8	
EQUIVALENT SCRUBBED CAPACITY - MW	550.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	21632.	(9306 BTU/LB)
AVERAGE ASH CONTENT - %	9.00	
AVERAGE MOISTURE CONTENT - %	18.00	
AVERAGE SULFUR CONTENT - %	.56	
AVERAGE CHLORIDE CONTENT - %	.01	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	SODIUM CARBONATE	
SYSTEM SUPPLIER	AIR CORRECTION DIVISION, UOP	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	.2	
INITIAL START-UP DATE	9/79	
COMMERCIAL START-UP DATE	2/80	
SO2 DESIGN REMOVAL EFFICIENCY - %	91.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT IS STILL IN THE SHAKEDOWN PHASE OF OPERATIONS. A NUMBER OF MECHANICAL PROBLEMS AND SOME CONTROL PROBLEMS HAVE BEEN ENCOUNTERED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	41	27.5	18.4	22.3	14.2						
	42	24.7	23.9	26.3	18.4						
	43	26.6	34.0	34.2	26.1						
	SYSTEM	26.3	25.4	27.6	19.6			720	553	141	

** PROBLEMS/SOLUTIONS/COMMENTS

ALL THREE MODULES WERE OUT OF SERVICE THE FIRST 21 DAYS OF APRIL WHILE THE UTILITY WAITED FOR DELIVERY OF NEW SPRAY NOZZLES. SOME PLUGGING HAD OCCURRED IN THE ORIGINAL NOZZLES. THE NEW NOZZLES WERE INSTALLED FOR TESTING PURPOSES.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	41	95.2	46.0	92.6	42.9						

PACIFIC POWER & LIGHT: JIM BRIDGER 4 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	42	72.4	75.1	71.7	70.1						
	43	100.0	81.6	100.0	76.1						
	SYSTEM	89.2	67.6	88.1	63.0			744	694	469	

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE 42 WAS FORCED OUT OF SERVICE FOR EIGHT DAYS IN MAY WHILE A VORTEX BREAKER WAS INSTALLED IN THE ABSORBER VESSEL. THE VESSEL WAS DRAINING BEFORE REACHING DESIGN FLUID LEVELS.

VORTEX BREAKERS WERE INSTALLED IN MODULES 41 AND 43 AS WELL BUT INSTALLATION IN THESE MODULES WAS NOT UNDERTAKEN DURING PERIODS WHEN MODULE SERVICE WAS REQUIRED.

6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR PROBLEMS OCCURRED DURING THE APRIL-JUNE PERIOD. PERFORMANCE FIGURES FOR JUNE WERE NOT AVAILABLE FOR THE SECOND QUARTER REPORT.

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                                          SECTION 3
              DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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 COMPANY NAME                                   PENNSYLVANIA POWER
 PLANT NAME                                     BRUCE MANSFIELD
 UNIT NUMBER                                    1
 CITY                                           SHIPPINGPORT
 STATE                                          PENNSYLVANIA
 GROSS UNIT GENERATING CAPACITY - MW              917.0
 NET UNIT GENERATING CAPACITY W/FGD - MW          825.0
 EQUIVALENT SCRUBBED CAPACITY - MW                917.0

 ** FUEL DATA
     FUEL TYPE                                  COAL
     FUEL GRADE                                 BITUMINOUS
     AVERAGE HEAT CONTENT - J/G                  26749.        ( 11500 BTU/LB)
     AVERAGE ASH CONTENT - %                       12.90
     AVERAGE MOISTURE CONTENT - %                   7.00
     AVERAGE SULFUR CONTENT - %                     3.00
     AVERAGE CHLORIDE CONTENT - %               ********

 ** GENERAL EMISSION CONTROL SYSTEM DATA
     GENERAL PROCESS TYPE                       WET SCRUBBING
     PROCESS TYPE                               LIME
     SYSTEM SUPPLIER                            CHEMICO DIVISION, ENVIROTECH
     NEW/RETROFIT                               NEW
     ENERGY CONSUMPTION - %                         6.0
     INITIAL START-UP DATE                      12/75
     COMMERCIAL START-UP DATE                    6/76
     SO2 DESIGN REMOVAL EFFICIENCY - %             92.10
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %     99.80
     ABSORBER SPARE CAPACITY INDEX - %               .0
     ABSORBER SPARE COMPONENTS INDEX                 .0

 ** WATER LOOP
     TYPE                                       OPEN
     FRESH MAKE-UP WATER - LITER/S              *******        (***** GPM)

 ** TREATMENT
     TYPE                                       CALCILOX

 ** DISPOSAL
     TYPE                                       LANDFILL


-----------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  SYSTEM      98.6        100.0                    90.4                    744   672    672

 2/80  SYSTEM      98.1        100.0                    93.7                    696   652    652

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         NO MAJOR FGD-RELATED PROBLEMS OCCURRED DURING JANUARY AND FEBRUARY.

 3/80  SYSTEM      98.8        100.0                    83.7                    744   623    623

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE BOILER WAS OUT OF SERVICE ONE WEEK IN MARCH DUE TO A PLUGGED AIR
                         PREHEATER.  NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED FOR MARCH.

 4/80  SYSTEM                                                                   720

 5/80  SYSTEM                                                                   744

 6/80  SYSTEM                                                                   720
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PENNSYLVANIA POWER: BRUCE MANSFIELD 1 (CONT.)

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-------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD    CAP.
                                                                 SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                        INFORMATION FOR THE APRIL THROUGH JUNE PERIOD WAS NOT AVAILABLE.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	PENNSYLVANIA POWER	
PLANT NAME	BRUCE MANSFIELD	
UNIT NUMBER	2	
CITY	SHIPPINGPORT	
STATE	PENNSYLVANIA	
GROSS UNIT GENERATING CAPACITY - MW	917.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	825.0	
EQUIVALENT SCRUBBED CAPACITY - MW	917.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26749.	(11500 BTU/LB)
AVERAGE ASH CONTENT - %	12.90	
AVERAGE MOISTURE CONTENT - %	7.00	
AVERAGE SULFUR CONTENT - %	3.00	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	CHEMICO DIVISION, ENVIROTECH	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	6.0	
INITIAL START-UP DATE	7/77	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	92.10	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.80	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	********	(***** GPM)
** TREATMENT		
TYPE	CALCILOX	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	97.1	100.0		90.6			744	674	674	
2/80	SYSTEM	94.7	100.0		99.8			696	694	694	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM EXPERIENCED NO MAJOR PROBLEMS DURING JANUARY AND FEBRUARY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	SYSTEM	98.4	100.0		51.1			744	380	380	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS OUT OF SERVICE 16 DAYS IN MARCH FOR A SCHEDULED BOILER INSPECTION. NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

PENNSYLVANIA POWER: BRUCE MANSFIELD 2 (CONT.)

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-------------------------------------------PERFORMANCE DATA--------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

      ** PROBLEMS/SOLUTIONS/COMMENTS

                        INFORMATION FOR THE APRIL THROUGH JUNE PERIOD WAS NOT AVAILABLE.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

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COMPANY NAME                                        PENNSYLVANIA POWER
PLANT NAME                                          BRUCE MANSFIELD
UNIT NUMBER                                         3
CITY                                                SHIPPINGPORT
STATE                                               PENNSYLVANIA
REGULATORY CLASSIFICATION                           D
PARTICULATE EMISSION LIMITATION - NG/J                32.         (  .075 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J                       258.         (  .600 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW                  2751.0
GROSS UNIT GENERATING CAPACITY - MW                  917.0
NET UNIT GENERATING CAPACITY W/FGD - MW               825.0
NET UNIT GENERATING CAPACITY WO/FGD - MW            *******
EQUIVALENT SCRUBBED CAPACITY - MW                    917.0

** BOILER DATA
    SUPPLIER                                        FOSTER WHEELER
    TYPE                                            PULVERIZED COAL
    SERVICE LOAD                                    BASE
    COMMERCIAL SERVICE DATE                         **/**
    MAXIMUM BOILER FLUE GAS FLOW - CU.M/S            1561.05      (3308000 ACFM)
    FLUE GAS TEMPERATURE - C                          140.6       ( 285 F)
    STACK HEIGHT - M                                  183.        ( 600 FT)
    STACK TOP DIAMETER - M                          *******       (***** FT)

** FUEL DATA
    FUEL TYPE                                       COAL
    FUEL GRADE                                      ******
    AVERAGE HEAT CONTENT - J/G                       26749.       ( 11500 BTU/LB)
    RANGE HEAT CONTENT - BTU/LB                                    11.500-11,950
    AVERAGE ASH CONTENT - %                            12.50
    RANGE ASH CONTENT - %                           11.5-13.5
    AVERAGE MOISTURE CONTENT - %                        7.00
    RANGE MOISTURE CONTENT - %                      5.5-8.5
    AVERAGE SULFUR CONTENT - %                          3.00
    RANGE SULFUR CONTENT - %                        1.75-3.75
    AVERAGE CHLORIDE CONTENT - %                    ********
    RANGE CHLORIDE CONTENT - %                      ******

** GENERAL EMISSION CONTROL SYSTEM DATA
    SALEABLE PRODUCT/THROWAWAY PRODUCT              THROWAWAY PRODUCT
    GENERAL PROCESS TYPE                            WET SCRUBBING
    PROCESS TYPE                                    LIME
    PROCESS ADDITIVES                               MG PROMOTED
    SYSTEM SUPPLIER                                 PULLMAN KELLOGG
    A-E FIRM                                        GILBERT/COMMONWEALTH ASSOCIATES
    DEVELOPMENT LEVEL                               FULL SCALE
    NEW/RETROFIT                                    NEW
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %          95.00
    SO2 DESIGN REMOVAL EFFICIENCY - %                  92.20
    COMMERCIAL DATE                                  6/80
    INITIAL START-UP                                10/80

** ESP
    NUMBER                                           3
    TYPE                                            COLD SIDE

** PARTICULATE SCRUBBER
    TYPE                                            NONE

** ABSORBER
    NUMBER                                           4
    TYPE                                            SPRAY TOWER
    INITIAL START UP                                 4/80
    SUPPLIER                                        PULLMAN KELLOGG
    NUMBER OF STAGES                                    6
    NUMBER OF NOZZLES                                 300
    PRESSURE DROP - KPA                                 7.0        (28.0 IN-H2O)
    SUPERFICAL GAS VELOCITY - M/SEC                     6.7        ( 22.0 FT/S)
    ABSORBER SPARE CAPACITY INDEX - %                   2.5
    ABSORBER SPARE COMPONENT INDEX                      1.0
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PENNSYLVANIA POWER: BRUCE MANSFIELD 3 (CONT.)

 ** FANS
     NUMBER                                      4
     TYPE                                       CENTRIFUGAL, RADIAL TIP
     SERVICE - WET/DRY                          DRY

 ** MIST ELIMINATOR
     TYPE                                       CHEVRON

 ** PUMPS
     SERVICE                                    NUMBER
     -------                                    ------
     ******                                     ****

 ** TANKS
     SERVICE                                    NUMBER
     -------                                    ------
     REACTION                                   ****
     LIME SLURRY                                ****

 ** REHEATER
     TYPE                                       DIRECT COMBUSTION
     TEMPERATURE BOOST - C                         22.2         (   40 F)

 ** THICKENER
     NUMBER                                      1

 ** TREATMENT
     TYPE                                       FLYASH STABILIZATION


---------------------------------------PERFORMANCE DATA---------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 5/80  SYSTEM                                                                720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                        INITIAL OPERATION OF THE FGD SYSTEM COMMENCED ON JUNE 9, 1980.  THE
                        UTILITY REPORTED THAT IT IS PRESENTLY IN THE PROCESS OF DEBUGGING THE
                        SYSTEM.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	PUBLIC SERVICE OF NEW MEXICO	
PLANT NAME	SAN JUAN	
UNIT NUMBER	1	
CITY	WATERFLOW	
STATE	NEW MEXICO	
GROSS UNIT GENERATING CAPACITY - MW	361.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	314.0	
EQUIVALENT SCRUBBED CAPACITY - MW	361.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	22795.	(9800 BTU/LB)
AVERAGE ASH CONTENT - %	18.00	
AVERAGE MOISTURE CONTENT - %	14.82	
AVERAGE SULFUR CONTENT - %	.80	
AVERAGE CHLORIDE CONTENT - %	.03	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	WELLMAN LORD	
SYSTEM SUPPLIER	DAVY MCKEE	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	4.4	
INITIAL START-UP DATE	4/78	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	90.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.80	
ABSORBER SPARE CAPACITY INDEX - %	33.0	
ABSORBER SPARE COMPONENTS INDEX	1.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	30.2	(480 GPM)
** BYPRODUCT		
BYPRODUCT NATURE	ELEMENTAL SULFUR	
DISPOSITION	MARKETED	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	A	81.0	51.0		42.0						
	B	96.0	42.0		35.0						
	C	.0	.0		.0						
	D	83.0	79.0		65.0						
	SYSTEM	87.0	57.0		47.0			744	610	351	
2/80	A	.0	.0		.0						
	B	99.0	94.0		86.0						
	C	3.0	3.0		2.0						
	D	99.0	98.0		89.0						
	SYSTEM	67.0	65.0		59.0			696	634	411	
3/80	A	.0	.0		.0						
	B	100.0	50.4		17.7						
	C	58.1	74.1		26.1						
	D	97.5	83.6		29.4						
	SYSTEM	85.2	69.4	99.0	24.4			744	262	182	31.0

** PROBLEMS/SOLUTIONS/COMMENTS

SCRUBBER OPERATIONS AT UNIT ONE ARE STILL LIMITED TO TWO MODULES BECAUSE OF THE CURRENT LACK OF REHEATER CAPACITY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	A	.0	.0		.0						

PUBLIC SERVICE OF NEW MEXICO: SAN JUAN 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR
	B	98.2	71.5		48.2						
	C	50.0	7.2		4.9						
	D	91.7	71.5		48.2						
	SYSTEM	100.0	75.3	100.0	50.7			720	485	365	55.8

** PROBLEMS/SOLUTIONS/COMMENTS

ONLY TWO MODULES ARE NEEDED AT THE PRESENT TIME TO MEET CURRENT SO2 EMISSION REGULATIONS.

A TUBE WALL LEAK CAUSED THE BOILER TO GO DOWN DURING APRIL.

HIGH VIBRATIONS IN THE BOOSTER BLOWER IN MODULE D FOLLOWED AFTER THE UNIT OUTAGE.

HIGH VIBRATIONS IN THE BOOSTER BLOWER CAUSED MODULE A TO BE UNAVAILABLE ALL MONTH.

REPAIR AND MAINTENANCE OF THE BOOSTER BLOWER AND ISOLATION DAMPERS IN MODULE C WERE PERFORMED THIS MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	A	73.1	62.1		55.9						
	B	99.7	37.2		33.5						
	C	75.5	71.8		64.7						
	D	80.2	19.9		17.9						
	SYSTEM	100.0	95.5	100.0	86.0			744	670	640	87.4

** PROBLEMS/SOLUTIONS/COMMENTS

BOOSTER BLOWER VIBRATIONS ARE CONTINUING IN ALL THE MODULES.

THERE WAS A UNIT OUTAGE SO THAT REPAIR WORK COULD BE DONE ON THE ESP.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	A	2.8	2.5		2.1						
	B	96.9	92.0		75.6						
	C	82.5	79.2		65.0						
	D	.1	.2		.1						
	SYSTEM	91.2	87.0	79.8	71.4			720	591	514	65.4

** PROBLEMS/SOLUTIONS/COMMENTS

A BOILER TUBE LEAKED FORCED THE UNIT DOWN THIS MONTH.

REPAIR WORK WAS DONE ON THE ISOLATION DAMPERS DURING JUNE.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	PUBLIC SERVICE OF NEW MEXICO	
PLANT NAME	SAN JUAN	
UNIT NUMBER	2	
CITY	WATERFLOW	
STATE	NEW MEXICO	
GROSS UNIT GENERATING CAPACITY - MW	350.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	316.0	
EQUIVALENT SCRUBBED CAPACITY - MW	350.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	22795.	(9800 BTU/LB)
AVERAGE ASH CONTENT - %	18.00	
AVERAGE MOISTURE CONTENT - %	14.82	
AVERAGE SULFUR CONTENT - %	.80	
AVERAGE CHLORIDE CONTENT - %	.03	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	WELLMAN LORD	
SYSTEM SUPPLIER	DAVY MCKEE	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	4.6	
INITIAL START-UP DATE	8/78	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	90.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50	
ABSORBER SPARE CAPACITY INDEX - %	33.0	
ABSORBER SPARE COMPONENTS INDEX	1.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	30.2	(480 GPM)
** BYPRODUCT		
BYPRODUCT NATURE	ELEMENTAL SULFUR	
DISPOSITION	MARKETED	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	E	92.0	63.0		62.0						
	F	.0	.0		.0						
	G	.0	.0		.0						
	H	.0	.0		.0						
	SYSTEM	31.0	21.0		21.0			744	737	155	
2/80	E	97.0	66.0		65.0						
	F	22.0	2.0		12.0						
	G	.0	.0		.0						
	H	.0	.0		.0						
	SYSTEM	40.0	23.0		26.0			696	683	178	
3/80	E	87.0	.0		.0						
	F	85.0	94.0		59.0						
	G	.0	.0		.0						
	H	.0	.0		.0						
	SYSTEM	57.0	31.0		20.0			744	472	147	33.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER ONLY ONE ABSORBER COULD BE OPERATED DUE TO AN ELECTRICAL PROBLEM. CURRENTLY, OPERATIONS ARE LIMITED TO TWO ABSORBERS UNTIL A NEW REHEATER IS INSTALLED, WHICH IS TO BE COMPLETED IN APRIL.

PUBLIC SERVICE OF NEW MEXICO: SAN JUAN 2 (CONT.)

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---------------------------------------------PERFORMANCE DATA---------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 4/80  E            99.3        91.3                    68.5
       F            99.9        71.1                    53.3
       G              .0          .0                      .0
       H            44.2        58.5                    43.9
       SYSTEM       81.1        73.6        80.2        55.2                    720   540    398  66.3

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          MODULE G IS DOWN FOR MAJOR REPAIRS WHICH WERE A RESULT OF AN INTERNAL FIRE
                          EARLIER IN THE YEAR.

                          A REGULATION CHANGE EFFECTIVE APRIL 18, NOW REQUIRES THAT 3 MODULES OPERATE
                          TO MEET SO2 REGULATIONS.

                          MODULE H WAS UNAVAILABLE IN THE BEGINNING OF THE MONTH.

 5/80  E            99.1        97.3                    86.7
       F            98.9        95.2                    84.8
       G              .0          .0                      .0
       H            98.9        91.9                    81.9
       SYSTEM       99.0        94.8       100.0        84.5                    744   663    628  79.1

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE BOILER WAS DOWN FOR SEVERAL HOURS FOR MINOR MAINTENANCE AND BOILER TUBE
                          REPAIRS.

 6/80  E            89.2        72.4                    60.0
       F            89.6        74.1                    57.3
       G              .0          .0                      .0
       H            88.8        83.8                    64.9
       SYSTEM       69.1        58.0        53.2        47.6                    720   557    342  69.6

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          AN ELECTRICAL CABLE FAILURE PREVENTED MODULES E AND F FROM OPERATING
                          SIMULTANEOUSLY.  AUXILIARY POWER COULD ONLY BE PROVIDED TO ONE MODULE.
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                                           SECTION 3
                  DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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 COMPANY NAME                                             PUBLIC SERVICE OF NEW MEXICO
 PLANT NAME                                               SAN JUAN
 UNIT NUMBER                                              3
 CITY                                                     WATERFLOW
 STATE                                                    NEW MEXICO
 GROSS UNIT GENERATING CAPACITY - MW                        534.0
 NET UNIT GENERATING CAPACITY W/FGD - MW                    468.0
 EQUIVALENT SCRUBBED CAPACITY - MW                          534.0

 ** FUEL DATA
     FUEL TYPE                                            COAL
     FUEL GRADE                                           SUBBITUMINOUS
     AVERAGE HEAT CONTENT - J/G                            18841.         (  8100 BTU/LB)
     AVERAGE ASH CONTENT - %                                  22.45
     AVERAGE MOISTURE CONTENT - %                             14.82
     AVERAGE SULFUR CONTENT - %                                 .80
     AVERAGE CHLORIDE CONTENT - %                               .07

 ** GENERAL EMISSION CONTROL SYSTEM DATA
     GENERAL PROCESS TYPE                                 WET SCRUBBING
     PROCESS TYPE                                         WELLMAN LORD
     SYSTEM SUPPLIER                                      DAVY MCKEE
     NEW/RETROFIT                                         NEW
     ENERGY CONSUMPTION - %                                     3.6
     INITIAL START-UP DATE                                12/79
     COMMERCIAL START-UP DATE                             **/**
     SO2 DESIGN REMOVAL EFFICIENCY - %                         90.00
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %                 99.50
     ABSORBER SPARE CAPACITY INDEX - %                           .0
     ABSORBER SPARE COMPONENTS INDEX                             .0

 ** BYPRODUCT
     BYPRODUCT NATURE                                     SULFURIC ACID
     DISPOSITION                                          MARKETED


--------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  M            86.0        54.4                     41.5
       SYSTEM                                                                 744   568

 2/80  M            98.0        13.6                      1.0
       SYSTEM                                                                 696    44

 3/80  M            85.5        78.3        79.6         56.7
       SYSTEM                                                                 744   539          53.0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             THE ONE MODULE CURRENTLY OPERATIONAL AT SAN JUAN 3 OPERATED WITHOUT ANY
                             MAJOR PROBLEMS DURING THE FIRST QUARTER.  THE BOILER WAS OFF LINE FOR
                             APPROXIMATELY 24 DAYS IN FEBRUARY DUE TO AN ELECTRICAL PROBLEM.

 4/80  M            92.1        82.7        90.1         71.8
       SYSTEM                                                                 720   625          77.0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             ONLY ONE MODULE WILL BE NEEDED UNTIL MAY, 1982 TO MEET CURRENT SO2 EMISSION
                             REGULATIONS.

                             MINOR REPAIR WORK WAS DONE TO THE BOILER THIS MONTH.  FGD SYSTEM AVAILABIL-
                             ITY WAS OVER 90%.

 5/80  M           100.0        78.1       100.0         32.7
       SYSTEM                                                                 744   311          35.0
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PUBLIC SERVICE OF NEW MEXICO: SAN JUAN 3 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS DOWN FOR SCHEDULED OUTAGE. AVAILABILITY WAS 1.0% FOR THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	M SYSTEM	49.0	47.3	39.2	27.6			720	460		55.0

** PROBLEMS/SOLUTIONS/COMMENTS

MINOR REPAIR AND MAINTENANCE OF THE BOILER CAUSED SYSTEM OUTAGE TIME.

THE FGD SYSTEM DID NOT OPERATE AFTER JUNE 19 DUE TO FAILURE OF THE MIST ELIMINATOR PADS AND BOTTOM BALLAST TRAY.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	SALT RIVER PROJECT	
PLANT NAME	CORONADO	
UNIT NUMBER	1	
CITY	ST. JOHNS	
STATE	ARIZONA	
GROSS UNIT GENERATING CAPACITY - MW	350.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	350.0	
EQUIVALENT SCRUBBED CAPACITY - MW	280.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	19306.	(8300 BTU/LB)
AVERAGE ASH CONTENT - %	25.00	
AVERAGE MOISTURE CONTENT - %	16.00	
AVERAGE SULFUR CONTENT - %	1.00	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	PULLMAN KELLOGG	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	4.3	
INITIAL START-UP DATE	11/79	
COMMERCIAL START-UP DATE	12/79	
SO2 DESIGN REMOVAL EFFICIENCY - %	66.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.87	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	17.0	(270 GPM)
** DISPOSAL		
TYPE	LINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE PERIOD THE STACK EMISSION TESTS WERE COMPLETED. NO OPERATIONAL INFORMATION WAS AVAILABLE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

ALTHOUGH FGD SYSTEM PERFORMANCE DATA IS BEING LOGGED, THE UTILITY REPORTED THAT THE INFORMATION IS UNAVAILABLE FOR RELEASE AT THIS TIME.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	SOUTH CAROLINA PUBLIC SERVICE	
PLANT NAME	WINYAH	
UNIT NUMBER	2	
CITY	GEORGETOWN	
STATE	SOUTH CAROLINA	
GROSS UNIT GENERATING CAPACITY - MW	280.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	258.0	
EQUIVALENT SCRUBBED CAPACITY - MW	140.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26749.	(11500 BTU/LB)
AVERAGE ASH CONTENT - %	13.50	
AVERAGE MOISTURE CONTENT - %	********	
AVERAGE SULFUR CONTENT - %	1.70	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	BABCOCK & WILCOX	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	1.1	
INITIAL START-UP DATE	7/77	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	34.50	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.40	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	6.3	(100 GPM)
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER 1980 THE UNIT OPERATED WITH NO MAJOR PROBLEMS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0	100.0	100.0	85.3			720	614	614	60.2
5/80	SYSTEM	95.8	94.8	94.8	77.7			744	609	578	61.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS OFF LINE IN MAY TO WASH DOWN THE ABSORBER MODULES. SYSTEM AVAILABILITY REMAINED OVER 90%.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	SYSTEM	100.0	100.0	100.0	99.6			720	718	718	76.6

SOUTH CAROLINA PUBLIC SERVICE: WINYAH 2 (CONT.)

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-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                  NUMEROUS LEAKS IN THE SYSTEM WERE REPAIRED THROUGHOUT THE PERIOD WHILE THE
                                  BOILER WAS ON LINE.  NO MAJOR OPERATIONAL PROBLEMS WERE REPORTED FOR APRIL,
                                  MAY, OR JUNE.
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                                      SECTION 3
                DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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 COMPANY NAME                                        SOUTH CAROLINA PUBLIC SERVICE
 PLANT NAME                                          WINYAH
 UNIT NUMBER                                         3
 CITY                                                GEORGETOWN
 STATE                                               SOUTH CAROLINA
 REGULATORY CLASSIFICATION                           B
 PARTICULATE EMISSION LIMITATION - NG/J              ******         (****** LB/MMBTU)
 SO2 EMISSION LIMITATION - NG/J                      ******         (****** LB/MMBTU)
 NET PLANT GENERATING CAPACITY - MW                  *******
 GROSS UNIT GENERATING CAPACITY - MW                   280.0
 NET UNIT GENERATING CAPACITY W/FGD - MW               252.0
 NET UNIT GENERATING CAPACITY WO/FGD - MW              258.0
 EQUIVALENT SCRUBBED CAPACITY - MW                     280.0

 ** BOILER DATA
    SUPPLIER                                         RILEY STOKER
    TYPE                                             PULVERIZED COAL
    SERVICE LOAD                                     BASE
    COMMERCIAL SERVICE DATE                          **/**
    MAXIMUM BOILER FLUE GAS FLOW - CU.M/S            ********       (******* ACFM)
    FLUE GAS TEMPERATURE - C                         *******        (**** F)
    STACK HEIGHT - M                                 ******         (**** FT)
    STACK TOP DIAMETER - M                           *******        (***** FT)

 ** FUEL DATA
    FUEL TYPE                                        COAL
    FUEL GRADE                                       ******
    AVERAGE HEAT CONTENT - J/G                        26749.        ( 11500 BTU/LB)
    RANGE HEAT CONTENT - BTU/LB                                      ******
    AVERAGE ASH CONTENT - %                          ********
    RANGE ASH CONTENT - %                            ******
    AVERAGE MOISTURE CONTENT - %                     ********
    RANGE MOISTURE CONTENT - %                       ******
    AVERAGE SULFUR CONTENT - %                           1.70
    RANGE SULFUR CONTENT - %                         ******
    AVERAGE CHLORIDE CONTENT - %                     ********
    RANGE CHLORIDE CONTENT - %                       ******

 ** GENERAL EMISSION CONTROL SYSTEM DATA
    SALEABLE PRODUCT/THROWAWAY PRODUCT               THROWAWAY PRODUCT
    GENERAL PROCESS TYPE                             WET SCRUBBING
    PROCESS TYPE                                     LIMESTONE
    SYSTEM SUPPLIER                                  BABCOCK & WILCOX
    A-E FIRM                                         BURNS & ROE
    DEVELOPMENT LEVEL                                FULL SCALE
    NEW/RETROFIT                                     NEW
    SO2 DESIGN REMOVAL EFFICIENCY - %                   69.00
    COMMERCIAL DATE                                   6/80
    INITIAL START-UP                                  5/80
    CONSTRUCTION INITIATION                           3/79

 ** ESP
    NUMBER                                            1
    SUPPLIER                                         RESEARCH-COTTRELL

 ** PARTICULATE SCRUBBER
    TYPE                                             NONE

 ** ABSORBER
    TYPE                                             SPRAY TOWER
    INITIAL START UP                                  5/80
    SUPPLIER                                         BABCOCK & WILCOX

 ** MIST ELIMINATOR
    TYPE                                             CHEVRON

 ** PUMPS
    SERVICE                                          NUMBER
    -------                                          ------
    ******                                           ****
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SOUTH CAROLINA PUBLIC SERVICE: WINYAH 3 (CONT.)

** REHEATER	
TYPE	HOT AIR INJECTION
HEATING MEDIUM	STEAM
** WATER LOOP	
TYPE	CLOSED

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	SYSTEM	64.2	60.0	60.0	46.0			720	559	336	59.5

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL OPERATIONS BEGAN JUNE 3, 1980.

THE INLET DAMPER LOCKED UP CAUSING THE FGD SYSTEM TO GO DOWN.

THERE HAVE BEEN CONTINUING PROBLEMS WITH THE THICKENER SUMP RESULTING FROM THE SUMP LOCATION. THE FGD SYSTEM WAS DOWN ABOUT A WEEK BECAUSE OF THIS.

COMPANY NAME	SOUTH MISSISSIPPI ELEC PWR	
PLANT NAME	R.D. MORROW	
UNIT NUMBER	1	
CITY	HATTISBURG	
STATE	MISSISSIPPI	
GROSS UNIT GENERATING CAPACITY - MW	200.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	180.0	
EQUIVALENT SCRUBBED CAPACITY - MW	124.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	27912.	(12000 BTU/LB)
AVERAGE ASH CONTENT - %	15.00	
AVERAGE MOISTURE CONTENT - %	6.50	
AVERAGE SULFUR CONTENT - %	1.30	
AVERAGE CHLORIDE CONTENT - %	.01	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	ENVIRONEERING, RILEY STOKER	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	5.5	
INITIAL START-UP DATE	8/78	
COMMERCIAL START-UP DATE	8/79	
SO2 DESIGN REMOVAL EFFICIENCY - %	52.70	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.60	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	FLYASH STABILIZATION	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	.0		.0	.0			740	0	0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT REMAINED OFF LINE DURING JANUARY AS RELINING OF THE SCRUBBERS WAS COMING TO COMPLETION.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	SYSTEM	.0			.0			696	0	0	
3/80	SYSTEM	41.5	95.1	100.0	39.5			744	309	294	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH THE UNIT 1 FGD SYSTEM RETURNED TO SERVICE OPERATING 294 HOURS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0	99.0	100.0	99.0			720	720	713	

** PROBLEMS/SOLUTIONS/COMMENTS

THERE WERE NO OPERATIONAL PROBLEMS RELATED TO THE FGD SYSTEM DURING APRIL. FOUR INSPECTIONS WERE PERFORMED WHICH REQUIRED THE FGD SYSTEM TO BE OUT OF SERVICE FOR SEVEN HOURS.

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-----------------------------------------------PERFORMANCE DATA--------------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 5/80  SYSTEM       99.7         99.5        100.0        88.7                   744   660    658

      ** PROBLEMS/SOLUTIONS/COMMENTS

                            THE BOILER WAS SCHEDULED TO BE OUT OF SERVICE FOR 84 HOURS TO CLEAN THE
                            AIR PREHEATERS.  THE BOILER OPERATED THE REMAINING HOURS IN MAY.

                            THE FGD SYSTEM WAS SCHEDULED TO BE OUT OF SERVICE FOR 1.5 HOURS FOR ROU-
                            TINE MODULE INSPECTION.  THE FGD SYSTEM WAS AVAILABLE 99.7% DURING MAY.

 6/80  SYSTEM       99.2         97.0         99.0        93.0   90.00           720   690    668  68.9

      ** PROBLEMS/SOLUTIONS/COMMENTS

                            DURING JUNE OPERATIONS CAME TO A HAULT FOR APPROXIMATELY 6 HOURS TO CLEAN
                            THE MIST ELIMINATORS.  OTHER OUTAGE TIME DURING THE MONTH WAS CAUSED
                            BY BOILER-RELATED PROBLEMS.
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                                                    EPA UTILITY FGD SURVEY: APRIL - JUNE 1981

                                                              SECTION 3
                                 DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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COMPANY NAME                                       SOUTH MISSISSIPPI ELEC PWR
PLANT NAME                                         R.D. MORROW
UNIT NUMBER                                        2
CITY                                               HATTISBURG
STATE                                              MISSISSIPPI
GROSS UNIT GENERATING CAPACITY - MW                  200.0
NET UNIT GENERATING CAPACITY W/FGD - MW              180.0
EQUIVALENT SCRUBBED CAPACITY - MW                    124.0

** FUEL DATA
    FUEL TYPE                                      COAL
    FUEL GRADE                                     BITUMINOUS
    AVERAGE HEAT CONTENT - J/G                      27912.         ( 12000 BTU/LB)
    AVERAGE ASH CONTENT - %                            15.00
    AVERAGE MOISTURE CONTENT - %                        6.50
    AVERAGE SULFUR CONTENT - %                          1.30
    AVERAGE CHLORIDE CONTENT - %                         .01

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                           WET SCRUBBING
    PROCESS TYPE                                   LIMESTONE
    SYSTEM SUPPLIER                                ENVIRONEERING, RILEY STOKER
    NEW/RETROFIT                                   NEW
    ENERGY CONSUMPTION - %                              5.5
    INITIAL START-UP DATE                           6/79
    COMMERCIAL START-UP DATE                        6/79
    SO2 DESIGN REMOVAL EFFICIENCY - %                  52.70
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %          99.60
    ABSORBER SPARE CAPACITY INDEX - %                    .0
    ABSORBER SPARE COMPONENTS INDEX                      .0

** WATER LOOP
    TYPE                                           CLOSED
    FRESH MAKE-UP WATER - LITER/S                  *******         (***** GPM)

** TREATMENT
    TYPE                                           FLYASH STABILIZATION

** DISPOSAL
    TYPE                                           LANDFILL


-------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD    CAP.
                                                               SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  SYSTEM      .0                      .0          .0                   744   698     0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE UNIT REMAINED OFF LINE DURING JANUARY WHILE SCRUBBER LINER REPAIRS
                           CONTINUED.

 2/80  SYSTEM      .0          .0          .0          .0                   696   650     0

 3/80  SYSTEM      .0          .0          .0          .0                   744   486     0

 4/80  SYSTEM      .0                                  .0                   720     0     0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE FGD SYSTEM REMAINED OFF LINE THROUGH APRIL AS SCRUBBER LINER REPAIRS
                           CONTINUED.  THE UNIT IS EXPECTED BACK ON LINE AT THE END OF MAY.

 5/80  SYSTEM     2.4         14.2        14.2         2.4                  744   127    18
```

PERFORMANCE DATA											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT REMAINED OFF LINE DURING MOST OF MAY TO COMPLETE SCRUBBER AND STACK LINING MODIFICATIONS.

THE BOILER OPERATED 127 HOURS IN MAY; HOWEVER, THE FGD SYSTEM OPERATED ONLY 18 HOURS BECAUSE OF COMPUTER CONTROL PROBLEMS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	SYSTEM	99.3	90.0	99.1	78.0	90.00		720	625	561	68.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM COMPUTER LOST POWER DURING JUNE CAUSING THE UNIT TO BE SHUT DOWN FOR 25 MINUTES.

DURING JUNE OPERATIONS CAME TO A HAULT FOR APPROXIMATELY 5 HOURS TO CLEAN MIST ELIMINATORS. OTHER OUTAGE TIME DURING THE MONTH WAS CAUSED BY BOILER RELATED PROBLEMS.

COMPANY NAME	SOUTHERN ILLINOIS POWER COOP
PLANT NAME	MARION
UNIT NUMBER	4
CITY	MARION
STATE	ILLINOIS
GROSS UNIT GENERATING CAPACITY - MW	184.0
NET UNIT GENERATING CAPACITY W/FGD - MW	160.0
EQUIVALENT SCRUBBED CAPACITY - MW	184.0
** FUEL DATA	
FUEL TYPE	COAL/REFUSE
FUEL GRADE	******
AVERAGE HEAT CONTENT - J/G	20934. (9000 BTU/LB)
AVERAGE ASH CONTENT - %	16.00
AVERAGE MOISTURE CONTENT - %	10.00
AVERAGE SULFUR CONTENT - %	3.50
AVERAGE CHLORIDE CONTENT - %	.10
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
SYSTEM SUPPLIER	BABCOCK & WILCOX
NEW/RETROFIT	NEW
ENERGY CONSUMPTION - %	*******
INITIAL START-UP DATE	5/79
COMMERCIAL START-UP DATE	5/79
SO2 DESIGN REMOVAL EFFICIENCY - %	89.40
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.60
ABSORBER SPARE CAPACITY INDEX - %	.0
ABSORBER SPARE COMPONENTS INDEX	.0
** WATER LOOP	
TYPE	OPEN
FRESH MAKE-UP WATER - LITER/S	******* (***** GPM)
** TREATMENT	
TYPE	FLYASH STABILIZATION
** DISPOSAL	
TYPE	LANDFILL

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/79	SYSTEM				.0			744	0	0	
11/79	SYSTEM		100.0		26.7			720	192	192	
12/79	SYSTEM		100.0		71.0			744	528	528	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN FROM OCTOBER 1 THROUGH NOVEMBER 17 FOR A BOILER/TURBINE INSPECTION. NO MAJOR FGD RELATED PROBLEMS WERE ENCOUNTERED DURING THE FOURTH QUARTER OF 1979 OTHER THAN SOME FREEZE-UPS CAUSED BY THE WINTER WEATHER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM		100.0		10.0			744	72	72	
2/80	SYSTEM		100.0		31.0			696	216	216	
3/80	SYSTEM		100.0		48.4			744	360	360	

```
----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           DURING JANUARY THE LOW BOILER AND SCRUBBER HOURS WERE A RESULT OF AN
                           18 DAY BOILER OUTAGE NEEDED FOR CORRECTION OF TUBE PROBLEMS.  BOILER
                           OUTAGES DUE TO TUBE PROBLEMS WERE ALSO EXPERIENCED IN FEBRUARY AND MARCH.

                           THE ONLY REPORTED FGD-RELATED PROBLEM DURING THE FIRST QUARTER OF 1980 WAS
                           MAINTAINING THE BELT ALIGNMENT IN THE SLUDGE DISPOSAL SYSTEM.

 4/80  SYSTEM                                                                  720

 5/80  SYSTEM                                                                  744

 6/80  SYSTEM                                                                  720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           INFORMATION FOR THE APRIL THROUGH JUNE PERIOD WAS NOT AVAILABLE.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	SOUTHERN INDIANA GAS & ELEC	
PLANT NAME	A.B. BROWN	
UNIT NUMBER	1	
CITY	WEST FRANKLIN	
STATE	INDIANA	
GROSS UNIT GENERATING CAPACITY - MW	265.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	250.0	
EQUIVALENT SCRUBBED CAPACITY - MW	265.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	25819.	(11100 BTU/LB)
AVERAGE ASH CONTENT - %	9.40	
AVERAGE MOISTURE CONTENT - %	13.30	
AVERAGE SULFUR CONTENT - %	3.35	
AVERAGE CHLORIDE CONTENT - %	.05	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	DUAL ALKALI	
SYSTEM SUPPLIER	FMC	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	.8	
INITIAL START-UP DATE	4/79	
COMMERCIAL START-UP DATE	4/79	
SO2 DESIGN REMOVAL EFFICIENCY - %	85.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50	
ABSORBER SPARE CAPACITY INDEX - %	20.0	
ABSORBER SPARE COMPONENTS INDEX	.3	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	NONE	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	A	99.0	96.5	99.1	96.4						
	B	99.0	99.0	99.1	99.0						
	SYSTEM	99.0	98.0	99.1	97.7			744	744	727	

** PROBLEMS/SOLUTIONS/COMMENTS

SEVEN HOURS OF FGD SYSTEM FORCED OUTAGE TIME DURING JANUARY WERE CAUSED BY A THICKENER RAKE STALL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	A	99.1	70.3	98.8	69.4						
	B	98.4	70.0	97.8	68.7						
	SYSTEM	98.8	70.2	98.3	69.1			696	687	481	

** PROBLEMS/SOLUTIONS/COMMENTS

SOME OUTAGE TIME IN FEBRUARY RESULTED FROM A WET SLUDGE PRODUCT. A CHEMICAL IMBALANCE CAUSED THE SLUDGE PROBLEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	A	98.7	64.8	95.2	26.5						
	B	99.2	51.6	96.3	21.1						
	SYSTEM	99.0	58.2	95.8	23.8			744	304	177	

SOUTHERN INDIANA GAS & ELEC: A.B. BROWN 1 (CONT.)

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-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                            DURING MARCH, BOILER DOWN TIME WAS DUE TO A SCHEDULED UNIT OUTAGE, DURING
                            WHICH TIME MAINTENANCE WAS PERFORMED ON THE SCRUBBER.

 4/80  A          100.0        96.8        100.0        92.9
       B          100.0        99.7        100.0        95.7
       SYSTEM     100.0        98.3        100.0        94.3                    720   691    679

       ** PROBLEMS/SOLUTIONS/COMMENTS

                            DURING APRIL, THERE WERE NO OPERATIONAL PROBLEMS WITH THE FGD SYSTEM.  THE
                            SYSTEM WAS AVAILABLE 100% OF THE TIME.

 5/80  A          100.0       100.0        100.0        82.8
       B          100.0       100.0        100.0        82.8
       SYSTEM     100.0       100.0        100.0        82.8                    744   604    616  53.7

       ** PROBLEMS/SOLUTIONS/COMMENTS

                            DURING MAY NO FORCED OUTAGES WERE EXPERIENCED WITH THE FGD SYSTEM.  THE
                            BOILER WAS OFF LINE FOR 140 HOURS DURING THE MONTH FOR GENERAL MAINTENANCE,
                            DURING WHICH TIME SOME GENERAL FGD SYSTEM MAINTENANCE WAS ALSO PERFORMED.

 6/80  A          100.0       100.0        100.0        98.2
       B          100.0       100.0        100.0        98.2
       SYSTEM     100.0       100.0        100.0        98.2                    720   706    707  59.0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                            NO FGD RELATED PROBLEMS WERE REPORTED FOR THE MONTH OF JUNE. THE FGD SYSTEM
                            OPERATED 100% OF THE TIME THE BOILER WAS ON LINE.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	SPRINGFIELD CITY UTILITIES
PLANT NAME	SOUTHWEST
UNIT NUMBER	1
CITY	SPRINGFIELD
STATE	MISSOURI
GROSS UNIT GENERATING CAPACITY - MW	194.0
NET UNIT GENERATING CAPACITY W/FGD - MW	173.0
EQUIVALENT SCRUBBED CAPACITY - MW	194.0
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	29075. (12500 BTU/LB)
AVERAGE ASH CONTENT - %	13.00
AVERAGE MOISTURE CONTENT - %	********
AVERAGE SULFUR CONTENT - %	3.50
AVERAGE CHLORIDE CONTENT - %	.30
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
SYSTEM SUPPLIER	AIR CORRECTION DIVISION, UOP
NEW/RETROFIT	NEW
ENERGY CONSUMPTION - %	4.6
INITIAL START-UP DATE	4/77
COMMERCIAL START-UP DATE	**/**
SO2 DESIGN REMOVAL EFFICIENCY - %	80.00
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.70
ABSORBER SPARE CAPACITY INDEX - %	20.0
ABSORBER SPARE COMPONENTS INDEX	.3
** WATER LOOP	
TYPE	CLOSED
FRESH MAKE-UP WATER - LITER/S	19.8 (315 GPM)
** DISPOSAL	
TYPE	LANDFILL

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	S-1	54.5	38.7	47.9	36.3			744	698	388	65.4
	S-2	68.7	72.6	73.1	68.1						
	SYSTEM	61.6	55.7	60.5	52.2						

** PROBLEMS/SOLUTIONS/COMMENTS

AT THE BEGINNING OF JANUARY AN S-1 ID FAN EXPANSION JOINT FAILED. THE BOILER WAS SHUTDOWN SOON AFTER FOR BOILER-RELATED PROBLEMS.

DURING THE LATTER PART OF THIS PERIOD THE S-1 MIST ELIMINATOR AND TRAP OUT TRAY HEADER FROZE. AFTER REPAIRS WERE MADE BOTH MODULES WERE PUT ON LINE. BOTH WERE KEPT RUNNING UNTIL JANUARY 20 WHEN A FLANGE BROKE LOOSE ON THE MIST ELIMINATOR HEADER.

AFTER MIST ELIMINATOR REPAIRS WERE COMPLETED THE S-1 MODULE OPERATED UNTIL JANUARY 27 WHEN FREEZING AIR LINES TO THE BALL MILLS PREVENTED THE USE OF BOTH MODULES DUE TO THE LACK OF SLURRY.

THE S-2 MODULE WAS ON LINE AT THE BEGINNING OF THE MONTH BUT DEVELOPED PRESATURATOR SPRAY NOZZLE PROBLEMS. WHILE THIS WAS BEING REPAIRED THE UNIT WAS TAKEN OFF LINE. APART FROM THIS TIME THE MODULE WAS ON LINE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	S-1	36.7	29.1	31.5	29.1			696	695	350	59.9
	S-2	73.8	71.7	73.2	71.6						
	SYSTEM	55.3	50.4	52.4	50.4						

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE S-1 MODULE WAS OUT OF SERVICE IN THE FIRST PART OF FEBRUARY DUE TO FROZEN AND BROKEN LINES. THE SUPERNATE LINE BROKE IN SEVERAL PLACES TAKING BOTH MODULES OUT OF SERVICE FOR SEVERAL DAYS. ONCE THIS WAS REPAIRED BOTH MODULES WERE IN SERVICE AS REQUIRED BY LOAD EXCEPT FOR A FEW MINOR TRIPS.

THE S-2 MODULE WAS EITHER IN SERVICE OR AVAILABLE FOR MOST OF THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	S-1	64.5	64.1	64.4	64.1						
	S-2	22.7	5.8	6.9	5.8						
	SYSTEM	43.7	35.0	35.7	35.0			744	744	260	57.7

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH THE S-1 MODULE WAS OUT FOR 11 DAYS TO CLEAN THE ABSORBER SECTION.

THE S-2 MODULE WAS OUT OF SERVICE FOR CLEANING THE ABSORBER SECTIONS AND MIST ELIMINATORS FOR NEARLY ALL THE PERIOD BUT WAS AVAILABLE ON MARCH 25. IT WAS NOT OPERATED, HOWEVER, BECAUSE OF LOW UNIT LOAD DEMANDS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	S-1	78.2	69.1		59.6						
	S-2	15.1	6.9		6.0						
	SYSTEM	46.7	37.9	37.9	32.8			720	621	236	42.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE S-1 MODULE EXPERIENCED SHORT OUTAGES DURING APRIL CAUSED BY SLURRY DRAW-OFF PUMP FAILURES AND MIST ELIMINATOR AND PRESATURATOR SPRAY SYSTEM PROBLEMS.

THE S-2 MODULE EXPERIENCED RECURRING HIGH FLUE GAS TEMPERATURE-RELATED PROBLEMS DURING THE MONTH. THIS WAS CORRECTED BY REPAIRING THE SCRUBBER INLET SCREEN.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	S-1	72.9	60.7	69.1	60.6						
	S-2	43.6	30.7	35.2	30.7						
	SYSTEM	58.3	45.7	52.2	45.7			744	744	340	56.7

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY THE S-1 SCRUBBER REQUIRED CLEANING.

PUMP AND PUMP CONTROL PROBLEMS ON THE S-1 SCRUBBING TRAIN OCCURRED DURING THE PERIOD.

THE S-2 MODULE WAS OFF LINE SEVERAL DAYS BECAUSE OF RECYCLE PUMP AND RECYCLE SYSTEM REPAIRS.

FLUE GAS OUTLET DUCT REPAIRS WERE REQUIRED ON THE S-2 MODULE IN MAY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	S-1	85.6	85.6	85.5	84.9						
	S-2	12.8	6.8	7.2	6.8						
	SYSTEM	49.2	45.8	47.4	45.8			720	720	330	66.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE S-1 MODULE WAS IN CONTINUOUS SERVICE DURING JUNE WITH SHORT DURATION OUTAGES FOR CLEANING, CONTROL SYSTEM DAMAGE CAUSED BY LIGHTNING, AND OTHER MINOR MISCELLANEOUS PROBLEMS.

THE S-2 MODULE WAS OUT OF SERVICE FOR APPROXIMATELY 23 DAYS IN JUNE BECAUSE OF A BROKEN SLURRY HOLD TANK AGITATOR SHAFT.

IN ADDITION TO THE OUTAGE CAUSED BY THE BROKEN SHAFT, THE S-2 MODULE HAD SHORT DURATION OUTAGES CAUSED BY RECYCLE PUMP AGITATOR PROBLEMS, CONTROL SYSTEM PROGRAMMING, AND OTHER MINOR MISCELLANEOUS PROBLEMS.

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                                       SECTION 3
                 DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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 COMPANY NAME                                      ST. JOE ZINC
 PLANT NAME                                        G.F. WEATON
 UNIT NUMBER                                       1
 CITY                                              MONACA
 STATE                                             PENNSYLVANIA
 GROSS UNIT GENERATING CAPACITY - MW                  60.0
 NET UNIT GENERATING CAPACITY W/FGD - MW              60.0
 EQUIVALENT SCRUBBED CAPACITY - MW                    60.0

 ** FUEL DATA
     FUEL TYPE                                     COAL
     FUEL GRADE                                    BITUMINOUS
     AVERAGE HEAT CONTENT - J/G                     29075.        ( 12500 BTU/LB)
     AVERAGE ASH CONTENT - %                           11.50
     AVERAGE MOISTURE CONTENT - %                  ********
     AVERAGE SULFUR CONTENT - %                         2.00
     AVERAGE CHLORIDE CONTENT - %                        .20

 ** GENERAL EMISSION CONTROL SYSTEM DATA
     GENERAL PROCESS TYPE                          WET SCRUBBING
     PROCESS TYPE                                  CITRATE
     SYSTEM SUPPLIER                               MORRISON & KNUDSEN/U.S.B.M.
     NEW/RETROFIT                                  RETROFIT
     ENERGY CONSUMPTION - %                        *******
     INITIAL START-UP DATE                         11/79
     COMMERCIAL START-UP DATE                       1/80
     SO2 DESIGN REMOVAL EFFICIENCY - %                90.00
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %        99.60
     ABSORBER SPARE CAPACITY INDEX - %                  .0
     ABSORBER SPARE COMPONENTS INDEX                    .0

 ** WATER LOOP
     TYPE                                          CLOSED
     FRESH MAKE-UP WATER - LITER/S                 *******        (***** GPM)

 ** BYPRODUCT
     BYPRODUCT NATURE                              ELEMENTAL SULFUR
     DISPOSITION


-----------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
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 1/80  SYSTEM                                                              744

 2/80  SYSTEM                                                              696

 3/80  SYSTEM                                                              744

        ** PROBLEMS/SOLUTIONS/COMMENTS

                            THE SYSTEM IS STILL GOING THROUGH THE DEBUGGING PHASE OF OPERATION.  SOME
                            EQUIPMENT PROBLEMS HAVE OCCURRED, ESPECIALLY WITH THE HYDROGEN SULFIDE
                            GENERATOR AND HEAT EXCHANGERS, ONE OF WHICH HAD TO BE REMOVED AND RETURNED
                            TO THE MANUFACTURER.  NO OPERATING HOURS WERE LOGGED DURING THE FIRST
                            QUARTER OF 1980 BRINGING THE TOTAL SYSTEM OPERATING HOURS TO 42 IN 1979.

 4/80  SYSTEM                                                              720

 5/80  SYSTEM                                                              744

 6/80  SYSTEM                                                              720
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---------------------------------------PERFORMANCE DATA---------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
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      ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE GEORGE F. WHEATON STATION HAS BEEN OPERATING AT A REDUCED LOAD OF 20
                           TO 30 MW SINCE DECEMBER, 1979 DUE TO THE SHUTDOWN OF THE ST. JOE ZINC CO.
                           SMELTER.  ALTHOUGH A NUMBER OF TRIAL RUNS OF THE CITRATE DEMONSTRATION
                           PLANT HAVE BEEN MADE DURING THE PAST SIX MONTHS, MECHANICAL BREAKDOWNS OF
                           EQUIPMENT AND PROBLEMS RELATED TO LOW TEMPERATURE OPERATION HAVE PREVENTED
                           CONTINUOUS OPERATION TO OBTAIN MEANINGFUL DATA.  ST. JOE IS ATTEMPTING TO
                           NEGOTIATE A POWER SALES AGREEMENT THAT WILL PERMIT FULL UTILIZATION OF THE
                           STATION CAPACITY AND ALSO PROVIDE DESIGN FLUE GAS QUANTITIES TO THE DEMON-
                           STRATION PLANT.  OPERATION OF THE POWER PLANT AT THE DESIGN RATES IS RE-
                           QUIRED FOR ACCEPTANCE AND DEMONSTRATION TESTING.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

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COMPANY NAME                                      TENNESSEE VALLEY AUTHORITY
PLANT NAME                                        SHAWNEE
UNIT NUMBER                                       10A
CITY                                              PADUCAH
STATE                                             KENTUCKY
GROSS UNIT GENERATING CAPACITY - MW                 10.0
NET UNIT GENERATING CAPACITY W/FGD - MW             10.0
EQUIVALENT SCRUBBED CAPACITY - MW                   10.0

** FUEL DATA
    FUEL TYPE                                     COAL
    FUEL GRADE                                    BITUMINOUS
    AVERAGE HEAT CONTENT - J/G                    *******         (****** BTU/LB)
    AVERAGE ASH CONTENT - %                       ********
    AVERAGE MOISTURE CONTENT - %                  ********
    AVERAGE SULFUR CONTENT - %                        2.90
    AVERAGE CHLORIDE CONTENT - %                  ********

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                          WET SCRUBBING
    PROCESS TYPE                                  LIME/LIMESTONE
    SYSTEM SUPPLIER                               AIR CORRECTION DIVISION, UOP
    NEW/RETROFIT                                  RETROFIT
    ENERGY CONSUMPTION - %                        *******
    INITIAL START-UP DATE                          4/72
    COMMERCIAL START-UP DATE                      **/**
    SO2 DESIGN REMOVAL EFFICIENCY - %             ********
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %     ********
    ABSORBER SPARE CAPACITY INDEX - %                   .0
    ABSORBER SPARE COMPONENTS INDEX                     .0

** WATER LOOP
    TYPE                                          CLOSED
    FRESH MAKE-UP WATER - LITER/S                 *******         (***** GPM)


-----------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2 PART.  HOURS HOURS  HOURS FACTOR
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 0/80  SYSTEM

       ** PROBLEMS/SOLUTIONS/COMMENTS

                    REFER TO THE PERFORMANCE UPDATE INFORMATION FOR SHAWNEE 10B.
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                                        SECTION 3
                 DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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 COMPANY NAME                                    TENNESSEE VALLEY AUTHORITY
 PLANT NAME                                      SHAWNEE
 UNIT NUMBER                                     10B
 CITY                                            PADUCAH
 STATE                                           KENTUCKY
 GROSS UNIT GENERATING CAPACITY - MW                10.0
 NET UNIT GENERATING CAPACITY W/FGD - MW            10.0
 EQUIVALENT SCRUBBED CAPACITY - MW                  10.0

 ** FUEL DATA
      FUEL TYPE                                  COAL
      FUEL GRADE                                 BITUMINOUS
      AVERAGE HEAT CONTENT - J/G                 *******        (****** BTU/LB)
      AVERAGE ASH CONTENT - %                    ********
      AVERAGE MOISTURE CONTENT - %               ********
      AVERAGE SULFUR CONTENT - %                     2.90
      AVERAGE CHLORIDE CONTENT - %               ********

 ** GENERAL EMISSION CONTROL SYSTEM DATA
      GENERAL PROCESS TYPE                       WET SCRUBBING
      PROCESS TYPE                               LIME/LIMESTONE
      SYSTEM SUPPLIER                            CHEMICO DIVISION, ENVIROTECH
      NEW/RETROFIT                               RETROFIT
      ENERGY CONSUMPTION - %                     *******
      INITIAL START-UP DATE                       4/72
      COMMERCIAL START-UP DATE                   **/**
      SO2 DESIGN REMOVAL EFFICIENCY - %          ********
      PARTICULATE DESIGN REMOVAL EFFICIENCY - %  ********
      ABSORBER SPARE CAPACITY INDEX - %               .0
      ABSORBER SPARE COMPONENTS INDEX                 .0

 ** WATER LOOP
      TYPE                                       CLOSED
      FRESH MAKE-UP WATER - LITER/S              *******        (***** GPM)


-------------------------------------------PERFORMANCE DATA--------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2 PART.  HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  SYSTEM                                                              744

 2/80  SYSTEM                                                              696

 3/80  SYSTEM                                                              744

      ** PROBLEMS/SOLUTIONS/COMMENTS
```

DURING THE FIRST QUARTER OF 1980, ONLY THE VENTURI/SPRAY TOWER SYSTEM WAS OPERATED. THE TCA SYSTEM CONTINUED TO OPERATE DURING THE QUARTER ON DOWA BASIC ALUMINUM SULFATE PROCESS UNDER EPRI/UOP/TVA SPONSORSHIP.

THE LIMESTONE/ADIPIC ACID TEST SERIES ON THE VENTURI/SPRAY TOWER SYSTEM, WHICH HAD BEEN INITIATED IN MID-DECEMBER TO INVESTIGATE THE RELATIONSHIP BETWEEN THE SLURRY PH AND THE ADIPIC ACID CONSUMPTION (DEGRADATION) RATE, WAS COMPLETED IN MID-FEBRUARY. THE TESTS WERE CONDUCTED WITHOUT FORCED OXIDATION AND WITH A SINGLE HOLD TANK. AT THE SCRUBBER INLET PH OF 4.6 TO 5.0, ESSENTIALLY ALL OF THE ADIPIC ACID ADDED WAS ACCOUNTED FOR IN THE LIQUID PHASE OF THE WASTE SLUDGE DISCHARGED FROM THE SYSTEM. AT THE SCRUBBER INLET PH 5.25 AND 5.5, THE ADIPIC ACID UNACCOUNTED FOR WERE 6% AND 26% , RESPECTIVELY. THEREFORE, IT APPEARS THAT THE ADIPIC ACID (OR CARBOXYLIC ACID) DEGRADATION TAKES PLACE AT SCRUBBER INLET PH ABOVE ABOUT 5.1 UNDER CONDITIONS ASKED.

A SERIES OF LIMESTONE/ADIPIC ACID TESTS WERE CONDUCTED FROM MID-FEBRUARY TO EARLY MARCH USING THE VENTURI SCRUBBER ONLY WITH A SINGLE TANK AND WITHOUT FORCED OXIDATION TO INVESTIGATE THE SO2 REMOVAL CAPABILITY OF THE VENTURI AT 5.1 INLET PH AND HIGH ADIPIC ACID CONCENTRATION. AT 4000 PPM ADIPIC ACID, L/G OF 21 GAL/MCF, AND 8.3 INCHES H2O PRESSURE DROP, SO2 REMOVAL WAS 65% WITH 2200 PPM INLET SO2 CONCENTRATION.

TENNESSEE VALLEY AUTHORITY: SHAWNEE 10B (CONT.)

PERFORMANCE DATA

FORCED OXIDATION USING A SINGLE TANK WITH LIMESTONE/ADIPIC ACID SLURRY ON THE VENTURI/SPRAY TOWER SYSTEM BEGAN IN MID-MARCH. AS IN THE CORRESPONDING TEST SERIES CONDUCTED ON TCA IN APRIL 1979, LIMESTONE BLINDING BY CALCIUM SULFITE OCCURRED. SOLUTION OF THE PROBLEM CAN BE EXPECTED BY USING TWO TANKS IN SERIES WITH FORCED OXIDATION IN THE FIRST TANK AND LIMESTONE ADDITION IN THE SECOND. THIS MODE IS PLANNED ON BEING DEMONSTRATED NEXT QUARTER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION FOR THE APRIL THROUGH JUNE PERIOD WAS NOT AVAILABLE.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	TENNESSEE VALLEY AUTHORITY	
PLANT NAME	WIDOWS CREEK	
UNIT NUMBER	8	
CITY	BRIDGEPORT	
STATE	ALABAMA	
GROSS UNIT GENERATING CAPACITY - MW	550.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	516.0	
EQUIVALENT SCRUBBED CAPACITY - MW	550.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	23260.	(10000 BTU/LB)
AVERAGE ASH CONTENT - %	25.00	
AVERAGE MOISTURE CONTENT - %	10.00	
AVERAGE SULFUR CONTENT - %	3.70	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	TENNESSEE VALLEY AUTHORITY	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	4.7	
INITIAL START-UP DATE	5/77	
COMMERCIAL START-UP DATE	1/78	
SO2 DESIGN REMOVAL EFFICIENCY - %	70.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	A	70.4	79.8		39.2						
	B	83.5	100.0		56.3						
	C	100.0	100.0		55.5						
	D	28.3	54.7		26.9						
	SYSTEM	70.6	83.6		44.5	83.60		744	366	331	23.9

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE UNIT 8 BOILER EXPERIENCED LOW AVAILABILITY, CAUSING THE FORCED OXIDATION TESTS TO BE DISCONTINUED UNTIL AFTER THE SCHEDULED MAINTENANCE OUTAGE WHICH WILL BEGIN IN SEPTEMBER 1980. THE FORCED OXIDATION TESTS ARE EXPECTED TO RESUME IN JANUARY 1981.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	A	80.0	88.6		72.7						
	B	86.5	90.2		74.0						
	C	91.1	97.6		80.0						
	D	87.6	98.2		80.6						
	SYSTEM	86.3	93.7		76.8	84.00		696	571	535	43.6

** PROBLEMS/SOLUTIONS/COMMENTS

BY FEBRUARY 27, 1980, THE DIFFERENTIAL PRESSURE ACROSS THE TRAIN C ABSORBER HAD REACHED 19 INCHES WATER GAGE. THE HIGH ABSORBER DIFFERENTIAL PRESSURE WAS CAUSED BY PLUGGING OF TURBULENT CONTACT ABSORBER (TCA) SPHERES WHICH WERE INSTALLED DURING SCRUBBER OPTIMIZATION TESTS. THE TCA SPHERES WILL BE REMOVED IN MARCH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	A	93.6	88.0		85.4						

TENNESSEE VALLEY AUTHORITY: WIDOWS CREEK 8 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	B	93.0	90.6		87.9						
	C	71.9	73.3		71.1						
	D	93.3	63.9		62.0						
	SYSTEM	86.0	79.0		76.6	82.60		744	722	570	50.4

** PROBLEMS/SOLUTIONS/COMMENTS

ON MARCH 3 THE TCA SPHERES INSTALLED IN TRAIN C AS PART OF THE OPTIMIZATION TESTS WERE REMOVED. THE SPHERES HAD BECOME PLUGGED, RESULTING IN AN ABSORBER DIFFERENTIAL PRESSURE OF 20 INCHES WATER GAGE. THE SPHERES HAD BEEN IN USE SINCE NOVEMBER 17, 1979.

4/80	A	96.8	82.7		46.5						
	B	97.2	79.5		44.7						
	C	96.3	90.4		50.8						
	D	95.0	70.9		39.9						
	SYSTEM	96.3	80.9		45.5			720	405	328	30.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE SCRUBBER SLURRY SPRAY NOZZLES WERE CLEANED AS PART OF A SCHEDULED MAINTENANCE OUTAGE.

BALL MILL LINERS AND LIFTER BARS WERE REPLACED IN APRIL DURING A SCHEDULED MAINTENANCE OUTAGE.

5/80	A	99.2	74.5		56.2						
	B	96.1	80.9		61.0						
	C	96.1	87.7		66.1						
	D	96.1	75.2		56.7						
	SYSTEM	96.9	79.6		60.0			744	561	447	38.3

** PROBLEMS/SOLUTIONS/COMMENTS

ON MAY 16 THE LIMESTONE BUCKET ELEVATOR FAILED CAUSING UNIT 8 TO BE REMOVED FROM SERVICE FOR 6 HOURS.

THE SCRUBBER SLURRY SPRAY NOZZLES ON THE B, C AND D MODULES WERE CLEANED DURING MAY. THE CLEANING KEPT THE SYSTEM OFF LINE FOR 23 HOURS.

THE UNIT 8 BALL MILL MALFUNCTIONED ON MAY 28, 1980 DUE TO FAILURE OF INLET BEARING BOLTS.

6/80	A	100.0	5.3	100.0	4.9						
	B	100.0	100.0	100.0	91.8						
	C	99.6	93.9	99.5	86.3						
	D	100.0	98.6	100.0	90.6						
	SYSTEM	99.9	74.5	99.8	68.3	82.20		720	661	492	44.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE THE BALL MILL REMAINED OUT OF SERVICE FOR MAJOR REPAIRS THAT INCLUDED REPAIR OF THE BALL MILL SHELL (CRACKS PRESENT). THE UNIT 7 SCRUBBER BALL MILL WAS USED IN PLACE OF THE UNIT 8 BALL MILL.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	TEXAS UTILITIES	
PLANT NAME	MARTIN LAKE	
UNIT NUMBER	1	
CITY	TATUM	
STATE	TEXAS	
GROSS UNIT GENERATING CAPACITY - MW	793.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	750.0	
EQUIVALENT SCRUBBED CAPACITY - MW	595.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	LIGNITE	
AVERAGE HEAT CONTENT - J/G	17166.	(7380 BTU/LB)
AVERAGE ASH CONTENT - %	8.00	
AVERAGE MOISTURE CONTENT - %	33.00	
AVERAGE SULFUR CONTENT - %	.90	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	RESEARCH-COTTRELL	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	1.3	
INITIAL START-UP DATE	4/77	
COMMERCIAL START-UP DATE	10/78	
SO2 DESIGN REMOVAL EFFICIENCY - %	71.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.40	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	34.6	(550 GPM)
** TREATMENT		
TYPE	FLYASH STABILIZATION	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

PLUGGING PROBLEMS CONTINUED IN THE FIRST QUARTER OF 1980, PARTICULARLY IN THE WETTED FILM CONTACT AREA AND THE MIST ELIMINATOR SECTION. THE MIST ELIMINATOR PLUGGING WAS RECENTLY SOLVED BY SWITCHING BACK TO LAKE WATER FOR MIST ELIMINATOR WASH FROM AN ASH POND WATER WASH THEY HAD BEEN TESTING.

THE FRP STRUCTURAL WORK IS BECOMING A PROBLEM. MUCH OF THE FRP SUPPORT WORK WAS REPLACED WITH STAINLESS STEEL.

THE UTILITY HAS PLANS TO INSTALL TWO NEW SCRUBBING TOWERS IN EARLY 1982. THE NEW TOWERS HAVE BECOME NECESSARY DUE TO THE INCREASING LIGNITE SULFUR CONTENT AND THE NEED FOR SPARE SCRUBBER CAPACITY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			

TEXAS UTILITIES: MARTIN LAKE 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

HIGH MAINTENANCE PROBLEMS REPORTED IN PREVIOUS MONTHS CONTINUED THROUGHOUT THE SECOND QUARTER OF 1980. THE ABSORBERS ARE STILL EXPERIENCING PLUGGING PROBLEMS.

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                                               SECTION 3
                  DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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   COMPANY NAME                                       TEXAS UTILITIES
   PLANT NAME                                         MARTIN LAKE
   UNIT NUMBER                                        2
   CITY                                               TATUM
   STATE                                              TEXAS
   GROSS UNIT GENERATING CAPACITY - MW                  793.0
   NET UNIT GENERATING CAPACITY W/FGD - MW              750.0
   EQUIVALENT SCRUBBED CAPACITY - MW                    595.0

   ** FUEL DATA
        FUEL TYPE                                     COAL
        FUEL GRADE                                    LIGNITE
        AVERAGE HEAT CONTENT - J/G                     17166.         (  7380 BTU/LB)
        AVERAGE ASH CONTENT - %                            8.00
        AVERAGE MOISTURE CONTENT - %                      33.00
        AVERAGE SULFUR CONTENT - %                          .90
        AVERAGE CHLORIDE CONTENT - %                  ********

   ** GENERAL EMISSION CONTROL SYSTEM DATA
        GENERAL PROCESS TYPE                          WET SCRUBBING
        PROCESS TYPE                                  LIMESTONE
        SYSTEM SUPPLIER                               RESEARCH-COTTRELL
        NEW/RETROFIT                                  NEW
        ENERGY CONSUMPTION - %                            1.3
        INITIAL START-UP DATE                          5/78
        COMMERCIAL START-UP DATE                      **/**
        SO2 DESIGN REMOVAL EFFICIENCY - %                71.00
        PARTICULATE DESIGN REMOVAL EFFICIENCY - %        99.40
        ABSORBER SPARE CAPACITY INDEX - %                   .0
        ABSORBER SPARE COMPONENTS INDEX                     .0

   ** WATER LOOP
        TYPE                                          CLOSED
        FRESH MAKE-UP WATER - LITER/S                    34.6         (  550 GPM)

   ** TREATMENT
        TYPE                                          FLYASH STABILIZATION

   ** DISPOSAL
        TYPE                                          LANDFILL


-------------------------------------------PERFORMANCE DATA-----------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
------ ------ ------------ ----------- ----------- -----------  SO2  PART. HOURS HOURS  HOURS FACTOR
                                                                ----- ----- ----- ------ ----- ------

 1/80  SYSTEM
                                                                             744
 2/80  SYSTEM
                                                                             696
 3/80  SYSTEM
                                                                             744
       ** PROBLEMS/SOLUTIONS/COMMENTS

                        PLUGGING PROBLEMS CONTINUED IN THE FIRST QUARTER OF 1980, PARTICULARLY IN
                        THE WETTED FILM CONTACT AREA AND THE MIST ELIMINATOR SECTION.  THE
                        MIST ELIMINATOR PLUGGING WAS RECENTLY SOLVED BY SWITCHING BACK TO LAKE
                        WATER FOR MIST ELIMINATOR WASH FROM AN ASH POND WATER WASH THEY HAD BEEN
                        TESTING.

                        THE FRP STRUCTURAL WORK IS BECOMING A PROBLEM.  MUCH OF THE FRP SUPPORT
                        WORK WAS REPLACED WITH STAINLESS STEEL.

                        THE UTILITY HAS PLANS TO INSTALL TWO NEW SCRUBBING TOWERS IN EARLY 1983.
                        THE NEW TOWERS HAVE BECOME NECESSARY DUE TO THE INCREASING LIGNITE SULFUR
                        CONTENT AND THE NEED FOR SPARE SCRUBBER CAPACITY.

 4/80  SYSTEM
                                                                             720
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TEXAS UTILITIES: MARTIN LAKE 2 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

HIGH MAINTENANCE PROBLEMS REPORTED IN PREVIOUS MONTHS CONTINUED THROUGHOUT THE SECOND QUARTER OF 1980. THE ABSORBERS ARE STILL EXPERIENCING PLUGGING PROBLEMS.

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EPA UTILITY FGD SURVEY: APRIL - JUNE 1980

                                              SECTION 3
                         DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
------------------------------------------------------------------------------------------------------------

 COMPANY NAME                                      TEXAS UTILITIES
 PLANT NAME                                        MARTIN LAKE
 UNIT NUMBER                                       3
 CITY                                              TATUM
 STATE                                             TEXAS
 GROSS UNIT GENERATING CAPACITY - MW                 793.0
 NET UNIT GENERATING CAPACITY W/FGD - MW             750.0
 EQUIVALENT SCRUBBED CAPACITY - MW                   595.0

 ** FUEL DATA
     FUEL TYPE                                     COAL
     FUEL GRADE                                    LIGNITE
     AVERAGE HEAT CONTENT - J/G                     17166.          (   7380 BTU/LB)
     AVERAGE ASH CONTENT - %                            8.00
     AVERAGE MOISTURE CONTENT - %                      33.00
     AVERAGE SULFUR CONTENT - %                          .90
     AVERAGE CHLORIDE CONTENT - %                  ********

 ** GENERAL EMISSION CONTROL SYSTEM DATA
     GENERAL PROCESS TYPE                          WET SCRUBBING
     PROCESS TYPE                                  LIMESTONE
     SYSTEM SUPPLIER                               RESEARCH-COTTRELL
     NEW/RETROFIT                                  NEW
     ENERGY CONSUMPTION - %                             1.3
     INITIAL START-UP DATE                          2/79
     COMMERCIAL START-UP DATE                      **/**
     SO2 DESIGN REMOVAL EFFICIENCY - %                 71.00
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %         99.40
     ABSORBER SPARE CAPACITY INDEX - %                   .0
     ABSORBER SPARE COMPONENTS INDEX                     .0

 ** TREATMENT
     TYPE                                          FLYASH STABILIZATION

 ** DISPOSAL
     TYPE                                          LANDFILL


-------------------------------------------PERFORMANCE DATA-------------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  SYSTEM                                                                744

 2/80  SYSTEM                                                                696

 3/80  SYSTEM                                                                744

         ** PROBLEMS/SOLUTIONS/COMMENTS

                                        PLUGGING PROBLEMS CONTINUED IN THE FIRST QUARTER OF 1980, PARTICULARLY IN
                                        THE WETTED FILM CONTACT AREA AND THE MIST ELIMINATOR SECTION.  THE
                                        MIST ELIMINATOR PLUGGING WAS RECENTLY SOLVED BY SWITCHING BACK TO LAKE
                                        WATER FOR MIST ELIMINATOR WASH FROM AN ASH POND WATER WASH THEY HAD BEEN
                                        TESTING.

                                        THE FRP STRUCTURAL WORK IS BECOMING A PROBLEM.  MUCH OF THE FRP SUPPORT
                                        WORK WAS REPLACED WITH STAINLESS STEEL.

                                        THE UTILITY HAS PLANS TO INSTALL TWO NEW SCRUBBING TOWERS IN EARLY 1983.
                                        THE NEW TOWERS HAVE BECOME NECESSARY DUE TO THE INCREASING LIGNITE SULFUR
                                        CONTENT AND THE NEED FOR SPARE SCRUBBER CAPACITY.

 4/80  SYSTEM                                                                720

 5/80  SYSTEM                                                                744

 6/80  SYSTEM                                                                720
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TEXAS UTILITIES: MARTIN LAKE 3 (CONT.)

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------------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
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** PROBLEMS/SOLUTIONS/COMMENTS

HIGH MAINTENANCE PROBLEMS REPORTED IN PREVIOUS MONTHS CONTINUED THROUGHOUT THE SECOND QUARTER OF 1980. THE ABSORBERS ARE STILL EXPERIENCING PLUGGING PROBLEMS.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	TEXAS UTILITIES	
PLANT NAME	MONTICELLO	
UNIT NUMBER	3	
CITY	MT. PLEASANT	
STATE	TEXAS	
GROSS UNIT GENERATING CAPACITY - MW	800.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	750.0	
EQUIVALENT SCRUBBED CAPACITY - MW	800.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	LIGNITE	
AVERAGE HEAT CONTENT - J/G	*******	(****** BTU/LB)
AVERAGE ASH CONTENT - %	18.90	
AVERAGE MOISTURE CONTENT - %	31.90	
AVERAGE SULFUR CONTENT - %	1.50	
AVERAGE CHLORIDE CONTENT - %	.04	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	CHEMICO DIVISION, ENVIROTECH	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	5/78	
COMMERCIAL START-UP DATE	10/78	
SO2 DESIGN REMOVAL EFFICIENCY - %	74.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	34.4	(546 GPM)
** TREATMENT		
TYPE	FLYASH STABILIZATION	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

NO PROBLEMS WERE ENCOUNTERED DURING THE FIRST QUARTER OF 1980.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE MONTICELLO 3 SCRUBBING SYSTEM PERFORMED WELL THROUGHOUT THE SECOND QUARTER OF 1980. THE TEXAS AIR CONTROL BOARD REPORTED THAT IT HAD RECEIVED VERY FEW EXCESS EMISSIONS REPORTS FROM THE STATION DURING THE APRIL-JUNE PERIOD.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	UTAH POWER & LIGHT	
PLANT NAME	HUNTER	
UNIT NUMBER	1	
CITY	CASTLE DALE	
STATE	UTAH	
GROSS UNIT GENERATING CAPACITY - MW	400.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	400.0	
EQUIVALENT SCRUBBED CAPACITY - MW	360.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	29075.	(12500 BTU/LB)
AVERAGE ASH CONTENT - %	10.00	
AVERAGE MOISTURE CONTENT - %	6.50	
AVERAGE SULFUR CONTENT - %	.55	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	CHEMICO DIVISION, ENVIROTECH	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	5/79	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	80.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	FLYASH STABILIZATION	
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/79	SYSTEM		100.0		95.6			744	711	711	
11/79	SYSTEM		100.0		91.1			720	656	656	
12/79	SYSTEM		100.0		98.2			744	731	731	
1/80	SYSTEM		100.0		95.9			744	713	713	
2/80	SYSTEM		100.0		86.8			696	604	604	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THERE WERE NO MAJOR FGD PROBLEMS ENCOUNTERED FROM OCTOBER 1979 THROUGH FEBRUARY 1980.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	SYSTEM		57.8		56.9			744	732	423	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS FORCED OF SERVICE IN MARCH BECAUSE THE THICKENER RAKE SHAFT FAILED AND THE TANK HAD TO BE DRAINED. THIS OUTAGE KEPT THE SYSTEM DOWN FOR APPROXIMATELY 309 HOURS.

UTAH POWER & LIGHT: HUNTER 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM		100.0		60.1			720	433	433	
5/80	SYSTEM		100.0		64.0			744	476	476	
	** PROBLEMS/SOLUTIONS/COMMENTS										
			THE LOW FGD HOURS DURING APRIL AND MAY RESULTED FROM THE ANNUAL OUTAGE FOR GENERAL FGD SYSTEM MAINTENANCE.								
6/80	SYSTEM		100.0		97.9			720	705	705	
	** PROBLEMS/SOLUTIONS/COMMENTS										
			NO FGD SYSTEM PROBLEMS WERE REPORTED FOR JUNE.								

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

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COMPANY NAME                                 UTAH POWER & LIGHT
PLANT NAME                                   HUNTER
UNIT NUMBER                                  2
CITY                                         CASTLE DALE
STATE                                        UTAH
REGULATORY CLASSIFICATION                    B
PARTICULATE EMISSION LIMITATION - NG/J         43.          (  .100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J                516.          ( 1.200 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW           *******
GROSS UNIT GENERATING CAPACITY - MW           400.0
NET UNIT GENERATING CAPACITY W/FGD - MW       400.0
NET UNIT GENERATING CAPACITY WO/FGD - MW     *******
EQUIVALENT SCRUBBED CAPACITY - MW             360.0

** BOILER DATA
    SUPPLIER                                 ******
    TYPE                                     PULVERIZED COAL
    SERVICE LOAD                             BASE
    COMMERCIAL SERVICE DATE                  **/**
    MAXIMUM BOILER FLUE GAS FLOW - CU.M/S    ********       (******* ACFM)
    FLUE GAS TEMPERATURE - C                 *******        (**** F)
    STACK HEIGHT - M                         ******         (**** FT)
    STACK TOP DIAMETER - M                   *******        (***** FT)

** FUEL DATA
    FUEL TYPE                                COAL
    FUEL GRADE                               ******
    AVERAGE HEAT CONTENT - J/G                29075.        ( 12500 BTU/LB)
    RANGE HEAT CONTENT - BTU/LB                               12,200 - 12,700
    AVERAGE ASH CONTENT - %                     10.00
    RANGE ASH CONTENT - %                    9 - 12
    AVERAGE MOISTURE CONTENT - %                 6.50
    RANGE MOISTURE CONTENT - %               ******
    AVERAGE SULFUR CONTENT - %                    .55
    RANGE SULFUR CONTENT - %                 ******
    AVERAGE CHLORIDE CONTENT - %             ********
    RANGE CHLORIDE CONTENT - %               ******

** GENERAL EMISSION CONTROL SYSTEM DATA
    SALEABLE PRODUCT/THROWAWAY PRODUCT       THROWAWAY PRODUCT
    GENERAL PROCESS TYPE                     WET SCRUBBING
    PROCESS TYPE                             LIME
    SYSTEM SUPPLIER                          CHEMICO DIVISION, ENVIROTECH
    A-E FIRM                                 STEARNS-ROGER
    DEVELOPMENT LEVEL                        FULL SCALE
    NEW/RETROFIT                             NEW
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %    99.50
    SO2 DESIGN REMOVAL EFFICIENCY - %            80.00
    INITIAL START-UP                          6/80

** ESP
    NUMBER                                    1

** PARTICULATE SCRUBBER
    TYPE                                     NONE

** ABSORBER
    TYPE                                     SPRAY TOWER
    INITIAL START UP                          6/80
    SUPPLIER                                 CHEMICO

** MIST ELIMINATOR
    TYPE                                     CHEVRON

** REHEATER
    TYPE                                     HOT AIR INJECTION

** REHEATER
    TYPE                                     BYPASS
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UTAH POWER & LIGHT: HUNTER 2 (CONT.)

** WATER LOOP	
TYPE	OPEN
** TREATMENT	
TYPE	FLYASH STABILIZATION
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

OPERATIONS COMMENCED AT THE HUNTER 2 STATION IN JUNE. THE UTILITY REPORTED THAT THE UNIT ALSO BECAME COMMERCIAL DURING THE MONTH.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	UTAH POWER & LIGHT	
PLANT NAME	HUNTINGTON	
UNIT NUMBER	1	
CITY	PRICE	
STATE	UTAH	
GROSS UNIT GENERATING CAPACITY - MW	430.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	400.0	
EQUIVALENT SCRUBBED CAPACITY - MW	366.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	29075.	(12500 BTU/LB)
AVERAGE ASH CONTENT - %	10.00	
AVERAGE MOISTURE CONTENT - %	6.50	
AVERAGE SULFUR CONTENT - %	.55	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	CHEMICO DIVISION, ENVIROTECH	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	1.6	
INITIAL START-UP DATE	5/78	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	80.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	18.9	(300 GPM)
** TREATMENT		
TYPE	FLYASH STABILIZATION	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/79	SYSTEM							744	497		
11/79	SYSTEM							720	28		
12/79	SYSTEM							744	642		
1/80	SYSTEM							744	668		

** PROBLEMS/SOLUTIONS/COMMENTS

DUE TO A LACK OF RECORDS, DATA CONCERNING THE FGD SYSTEM OPERATIONS WAS UNAVAILABLE FOR THE MONTHS OF OCTOBER 1979 THROUGH JANUARY 1980. IN NOVEMBER THE BOILER WAS DOWN MOST OF THE MONTH FOR A SCHEDULED UNIT OVERHAUL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	SYSTEM		100.0		87.0			696	605	605	
3/80	SYSTEM		100.0		89.2			744	664	664	
4/80	SYSTEM		98.1		92.1			720	676	663	

UTAH POWER & LIGHT: HUNTINGTON 1 (CONT.)

PERFORMANCE DATA

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM OPERATED ALONG WITH THE BOILER DURING FEBRUARY AND MARCH WITH NO MAJOR PROBLEMS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM		100.0		99.7			744	742	742	
6/80	SYSTEM		100.0		99.2			720	714	714	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM OPERATED ALONG WITH THE BOILER DURING THE APRIL THROUGH JUNE PERIOD EXCEPT FOR A FEW HOURS IN APRIL. THE UTILITY REPORTED THAT NO MAJOR PROBLEMS OCCURRED DURING THIS TIME.

SECTION 4
SUMMARY OF FGD SYSTEMS BY COMPANY

COMPANY NAME	TOTAL		STATUS							
			OPERATIONAL		CONSTRUCTION		CONTRACT AWARDED		PLANNED	
	NO.	MW	NO.	MW	NO.	MW	NO.	MW	NO.	MW
ALABAMA ELECTRIC COOP	2	358.	2	358.	0	0.	0	0.	0	0.
ARIZONA ELECTRIC POWER COOP	2	195.	2	195.	0	0.	0	0.	0	0.
ARIZONA PUBLIC SERVICE	8	2598.	5	962.	1	126.	2	1510.	0	0.
ASSOCIATED ELECTRIC COOP	1	670.	0	0.	1	670.	0	0.	0	0.
BASIN ELECTRIC POWER COOP	5	2590.	0	0.	4	2150.	0	0.	1	440.
BIG RIVERS ELECTRIC	4	1364.	1	242.	1	242.	0	0.	2	880.
CAJUN ELECTRIC POWER COOP	1	540.	0	0.	0	0.	0	0.	1	540.
CENTRAL ILLINOIS LIGHT	2	866.	1	416.	0	0.	0	0.	1	450.
CENTRAL ILLINOIS PUBLIC SERV	1	617.	1	617.	0	0.	0	0.	0	0.
CENTRAL MAINE POWER	1	600.	0	0.	0	0.	0	0.	1	600.
CINCINNATI GAS & ELECTRIC	2	1300.	0	0.	1	650.	0	0.	1	650.
COLORADO UTE ELECTRIC ASSN.	3	1341.	1	447.	1	447.	1	447.	0	0.
COLUMBUS & SOUTHERN OHIO ELEC.	4	1572.	2	822.	0	0.	0	0.	2	750.
COMMONWEALTH EDISON	1	450.	1	450.	0	0.	0	0.	0	0.
COOPERATIVE POWER ASSOCIATION	2	654.	1	327.	1	327.	0	0.	0	0.
DELMARVA POWER & LIGHT	4	730.	3	180.	0	0.	0	0.	1	550.
DESERET GEN & TRANS COOP	2	820.	0	0.	0	0.	0	0.	2	820.
DUQUESNE LIGHT	2	918.	2	918.	0	0.	0	0.	0	0.
EAST KENTUCKY POWER COOP	3	1800.	0	0.	1	500.	0	0.	2	1300.
GENERAL PUBLIC UTILITIES	6	3880.	0	0.	0	0.	0	0.	6	3880.
GRAND HAVEN BRD OF LIGHT & PWR	1	65.	0	0.	0	0.	1	65.	0	0.
HOOSIER ENERGY	2	882.	0	0.	2	882.	0	0.	0	0.
HOUSTON LIGHTING & POWER	3	1992.	0	0.	1	492.	0	0.	2	1500.
INDIANAPOLIS POWER & LIGHT	5	3012.	1	532.	1	530.	0	0.	3	1950.
IOWA ELECTRIC LIGHT & PWR	1	720.	0	0.	0	0.	0	0.	1	720.
JACKSONVILLE ELECT. AUTHORITY	2	1200.	0	0.	0	0.	0	0.	2	1200.
KANSAS CITY POWER & LIGHT	3	1054.	3	1054.	0	0.	0	0.	0	0.
KANSAS POWER & LIGHT	4	1575.	4	1575.	0	0.	0	0.	0	0.
KENTUCKY UTILITIES	1	64.	1	64.	0	0.	0	0.	0	0.
LAKELAND UTILITIES	1	364.	0	0.	1	364.	0	0.	0	0.
LANSING BOARD OF WATER & LIGHT	1	160.	0	0.	0	0.	0	0.	1	160.
LOS ANGELES DEPT OF WTR & PWR	4	3280.	0	0.	0	0.	0	0.	4	3280.
LOUISVILLE GAS & ELECTRIC	10	3554.	5	1201.	3	1203.	0	0.	2	1150.
MARQUETTE BOARD OF LIGHT & PWR	1	44.	0	0.	0	0.	0	0.	1	44.
MICHIGAN S. CENTRAL PWR AGENCY	1	55.	0	0.	0	0.	1	55.	0	0.
MIDDLE SOUTH UTILITIES	6	5340.	0	0.	0	0.	0	0.	6	5340.
MINNESOTA POWER & LIGHT	1	475.	1	475.	0	0.	0	0.	0	0.
MINNKOTA POWER COOPERATIVE	1	185.	1	185.	0	0.	0	0.	0	0.
MONONGAHELA POWER	2	1236.	1	618.	1	618.	0	0.	0	0.
MONTANA POWER	4	2120.	2	720.	2	1400.	0	0.	0	0.
MONTANA-DAKOTA UTILITIES	1	440.	0	0.	1	440.	0	0.	0	0.
MUSCATINE POWER & WATER	1	166.	0	0.	0	0.	1	166.	0	0.
NEBRASKA PUBLIC POWER DISTRICT	1	650.	0	0.	0	0.	0	0.	1	650.
NEVADA POWER	10	3215.	3	375.	0	0.	0	0.	7	2840.
NEW YORK STATE ELEC & GAS	1	870.	0	0.	0	0.	0	0.	1	870.
NIAGARA MOHAWK POWER COOP	1	100.	0	0.	1	100.	0	0.	0	0.
NORTHERN INDIANA PUB SERVICE	3	957.	1	115.	0	0.	2	842.	0	0.
NORTHERN STATES POWER	4	2450.	2	1480.	1	110.	0	0.	1	860.
PACIFIC GAS & ELECTRIC	2	1600.	0	0.	0	0.	0	0.	2	1600.
PACIFIC POWER & LIGHT	1	550.	1	550.	0	0.	0	0.	0	0.
PENNSYLVANIA POWER	3	2751.	3	2751.	0	0.	0	0.	0	0.
PHILADELPHIA ELECTRIC	3	724.	0	0.	2	574.	1	150.	0	0.
PLAINS ELECTRIC G & T COOP	1	233.	0	0.	0	0.	1	233.	0	0.
PLATTE RIVER POWER AUTHORITY	1	279.	0	0.	0	0.	1	279.	0	0.
PUBLIC SERVICE INDIANA	1	650.	0	0.	0	0.	1	650.	0	0.
PUBLIC SERVICE OF NEW MEXICO	4	1779.	3	1245.	1	534.	0	0.	0	0.
PWR AUTHORITY OF STATE OF NY	1	700.	0	0.	0	0.	0	0.	1	700.
SALT RIVER PROJECT	3	840.	1	280.	1	280.	0	0.	1	280.
SAN MIGUEL ELECTRIC COOP	1	400.	0	0.	1	400.	0	0.	0	0.
SEMINOLE ELECTRIC	2	1240.	0	0.	0	0.	2	1240.	0	0.
SIKESTON BOARD OF MUNIC. UTIL.	1	235.	0	0.	1	235.	0	0.	0	0.
SOUTH CAROLINA PUBLIC SERVICE	5	1700.	2	420.	1	280.	2	1000.	0	0.
SOUTH MISSISSIPPI ELEC PWR	2	248.	2	248.	0	0.	0	0.	0	0.
SOUTHERN ILLINOIS POWER COOP	2	484.	1	184.	0	0.	0	0.	1	300.
SOUTHERN INDIANA GAS & ELEC	1	265.	1	265.	0	0.	0	0.	0	0.

NOTE - PLANNED STATUS INCLUDES LETTER OF INTENT SIGNED, REQUESTING/EVALUTING BIDS, AND CONSIDERING ONLY FGD SYSTEMS

SECTION 4
SUMMARY OF FGD SYSTEMS BY COMPANY

	TOTAL		STATUS							
			OPERATIONAL		CONSTRUCTION		CONTRACT AWARDED		PLANNED	
COMPANY NAME	NO.	MW	NO.	MW	NO.	MW	NO.	MW	NO.	MW
SOUTHWESTERN ELECTRIC POWER	1	720.	0	0.	0	0.	1	720.	0	0.
SPRINGFIELD CITY UTILITIES	1	194.	1	194.	0	0.	0	0.	0	0.
SPRINGFIELD WATER, LIGHT & PWR	1	205.	0	0.	1	205.	0	0.	0	0.
ST. JOE ZINC	1	60.	1	60.	0	0.	0	0.	0	0.
SUNFLOWER ELECTRIC COOP	1	347.	0	0.	0	0.	1	347.	0	0.
TAMPA ELECTRIC	1	475.	0	0.	0	0.	1	475.	0	0.
TENNESSEE VALLEY AUTHORITY	7	3153.	3	570.	3	1983.	1	600.	0	0.
TEXAS MUNICIPAL POWER AGENCY	1	400.	0	0.	1	400.	0	0.	0	0.
TEXAS POWER & LIGHT	3	1882.	0	0.	1	382.	2	1500.	0	0.
TEXAS UTILITIES	8	5585.	4	2585.	0	0.	1	750.	3	2250.
TUCSON ELECTRIC POWER	2	740.	0	0.	0	0.	2	740.	0	0.
UNITED POWER ASSOCIATION	1	50.	0	0.	0	0.	1	50.	0	0.
UTAH POWER & LIGHT	5	1886.	3	1086.	0	0.	2	800.	0	0.
WEST PENN POWER	1	300.	0	0.	0	0.	1	300.	0	0.
TOTALS	200	90763.	73	24766.	38	16524.	29	12919.	60	36554.

NOTE - PLANNED STATUS INCLUDES LETTER OF INTENT SIGNED, REQUESTING/EVALUTING BIDS,
AND CONSIDERING ONLY FGD SYSTEMS

SECTION 5
SUMMARY OF FGD SYSTEMS BY SYSTEM SUPPLIER

SYSTEM SUPPLIER/PROCESS	TOTAL		STATUS					
			OPERATIONAL		CONSTRUCTION		CONTRACT AWARDED	
	NO.	MW	NO.	MW	NO.	MW	NO.	MW
ADL/COMBUSTION EQUIP ASSOCIATE								
DUAL ALKALI	1	299.	1	299.	0	0.	0	0.
LIME	1	500.	0	0.	1	500.	0	0.
LIME/ALKALINE FLYASH	5	2305.	3	905.	2	1400.	0	0.
SODIUM CARBONATE	3	375.	3	375.	0	0.	0	0.
TOTAL -	10	3479.	7	1579.	3	1900.	0	0.
AIR CORRECTION DIVISION, UOP								
LIME	2	822.	2	822.	0	0.	0	0.
LIMESTONE	4	1896.	3	1176.	0	0.	1	720.
LIME/LIMESTONE	1	10.	1	10.	0	0.	0	0.
SODIUM CARBONATE	1	550.	1	550.	0	0.	0	0.
TOTAL -	8	3278.	7	2558.	0	0.	1	720.
AMERICAN AIR FILTER								
LIME	6	1673.	4	936.	2	737.	0	0.
LIMESTONE	1	280.	0	0.	1	280.	0	0.
TOTAL -	7	1953.	4	936.	3	1017.	0	0.
BABCOCK & WILCOX								
LIME	4	1951.	1	618.	2	1268.	1	65.
LIMESTONE	8	2532.	4	1478.	3	999.	1	55.
LIME/SPRAY DRYING	2	1017.	0	0.	1	570.	1	447.
TOTAL -	14	5500.	5	2096.	6	2837.	3	567.
BUELL DIVISION, ENVIROTECH								
DUAL ALKALI	1	617.	1	617.	0	0.	0	0.
TOTAL -	1	617.	1	617.	0	0.	0	0.
CHEMICO DIVISION, ENVIROTECH								
LIME	8	4138.	7	3838.	0	0.	1	300.
LIMESTONE	8	5000.	1	800.	3	1900.	4	2300.
LIME/ALKALINE FLYASH	3	579.	3	579.	0	0.	0	0.
LIME/LIMESTONE	1	10.	1	10.	0	0.	0	0.
TOTAL -	20	9727.	12	5227.	3	1900.	5	2600.
COMBUSTION ENGINEERING								
LIME	6	1160.	4	452.	2	708.	0	0.
LIMESTONE	8	3165.	4	1575.	3	1357.	1	233.
LIMESTONE/ALKALINE FLYASH	2	1480.	2	1480.	0	0.	0	0.
LIME/ALKALINE FLYASH	2	654.	1	327.	1	327.	0	0.
TOTAL -	18	6459.	11	3834.	6	2392.	1	233.
DAVY MCKEE								
WELLMAN LORD	8	2074.	7	1540.	1	534.	0	0.
TOTAL -	8	2074.	7	1540.	1	534.	0	0.
ENVIRONEERING, RILEY STOKER								
LIMESTONE	3	664.	3	664.	0	0.	0	0.
MAGNESIUM OXIDE	1	600.	0	0.	0	0.	1	600.
TOTAL -	4	1264.	3	664.	0	0.	1	600.
FMC								
DUAL ALKALI	3	1107.	1	265.	0	0.	2	842.
TOTAL -	3	1107.	1	265.	0	0.	2	842.
JOY MFG/NIRO ATOMIZER								
LIME/SPRAY DRYING	6	1916.	0	0.	2	550.	4	1366.
TOTAL -	6	1916.	0	0.	2	550.	4	1366.
MITSUBISHI HEAVY INDUSTRIES								
LIMESTONE	2	882.	0	0.	2	882.	0	0.
TOTAL -	2	882.	0	0.	2	882.	0	0.

SECTION 5

SUMMARY OF FGD SYSTEMS BY SYSTEM SUPPLIER

			STATUS					
	TOTAL		OPERATIONAL		CONSTRUCTION		CONTRACT AWARDED	
SYSTEM SUPPLIER/PROCESS	NO.	MW	NO.	MW	NO.	MW	NO.	MW
MORRISON & KNUDSEN/U.S.B.M.								
CITRATE	1	60.	1	60.	0	0.	0	0.
TOTAL -	1	60.	1	60.	0	0.	0	0.
PEABODY PROCESS SYSTEMS								
LIMESTONE	8	3492.	3	805.	1	447.	4	2240.
LIME/ALKALINE FLYASH	1	475.	1	475.	0	0.	0	0.
TOTAL -	9	3967.	4	1280.	1	447.	4	2240.
PULLMAN KELLOGG								
LIME	1	917.	1	917.	0	0.	0	0.
LIMESTONE	4	1880.	1	280.	2	950.	1	650.
TOTAL -	5	2797.	2	1197.	2	950.	1	650.
RESEARCH-COTTRELL								
LIMESTONE	14	5280.	7	2363.	5	2001.	2	916.
LIME/LIMESTONE	1	475.	0	0.	0	0.	1	475.
LIME/SPRAY DRYING	1	50.	0	0.	0	0.	1	50.
TOTAL -	16	5805.	7	2363.	5	2001.	4	1441.
ROCKWELL INTERNATIONAL								
AQUEOUS CARBONATE/SPRAY DRYING	1	100.	0	0.	1	100.	0	0.
TOTAL -	1	100.	0	0.	1	100.	0	0.
TENNESSEE VALLEY AUTHORITY								
LIMESTONE	1	550.	1	550.	0	0.	0	0.
TOTAL -	1	550.	1	550.	0	0.	0	0.
UNITED ENGINEERS								
LIME	2	1510.	0	0.	0	0.	2	1510.
MAGNESIUM OXIDE	3	724.	0	0.	2	574.	1	150.
TOTAL -	5	2234.	0	0.	2	574.	3	1660.
WHEELABRATOR-FRYE/R.I.								
AQUEOUS CARBONATE/SPRAY DRYING	1	440.	0	0.	1	440.	0	0.
TOTAL -	1	440.	0	0.	1	440.	0	0.
TOTAL -	140	54209.	73	24766.	38	16524.	29	12919.

EPA UTILITY FGD SURVEY: APRIL - JUNE 1980

SECTION 6
SUMMARY OF FGD SYSTEMS BY PROCESS

PROCESS	TOTAL NO.	TOTAL MW	OPERATIONAL NO.	OPERATIONAL MW	CONSTRUCTION NO.	CONSTRUCTION MW	CONTRACT AWARDED NO.	CONTRACT AWARDED MW	PLANNED NO.	PLANNED MW
AQUEOUS CARBONATE/SPRAY DRYING	1	100.	0	0.	1	100.	0	0.	0	0.
CITRATE	1	60.	1	60.	0	0.	0	0.	0	0.
LIMESTONE	3	1766.	0	0.	0	0.	1	166.	2	1600.
LIME/LIMESTONE	1	475.	0	0.	0	0.	1	475.	0	0.
MAGNESIUM OXIDE	4	1324.	0	0.	2	574.	2	750.	0	0.
WELLMAN LORD	8	2074.	7	1540.	1	534.	0	0.	0	0.
SUBTOTAL - SALEABLE PRODUCT	18	5799.	8	1600.	4	1208.	4	1391.	2	1600.
AQUEOUS CARBONATE/SPRAY DRYING	1	440.	0	0.	1	440.	0	0.	0	0.
DUAL ALKALI	5	2023.	3	1181.	0	0.	2	842.	0	0.
LIME	36	16831.	19	7583.	7	3213.	4	1875.	6	4160.
LIMESTONE	72	32905.	27	9691.	20	8816.	13	6948.	12	7450.
LIMESTONE/ALKALINE FLYASH	2	1480.	2	1480.	0	0.	0	0.	0	0.
LIME/ALKALINE FLYASH	11	4013.	8	2286.	3	1727.	0	0.	0	0.
LIME/LIMESTONE	2	20.	2	20.	0	0.	0	0.	0	0.
LIME/SPRAY DRYING	10	3027.	0	0.	3	1120.	6	1863.	1	44.
PROCESS NOT SELECTED	10	5970.	0	0.	0	0.	0	0.	10	5970.
SODIUM CARBONATE	5	1175.	4	925.	0	0.	0	0.	1	250.
SUBTOTAL - THROWAWAY PRODUCT	154	67884.	65	23166.	34	15316.	25	11528.	30	17874.
TOTALS	172	73683.	73	24766.	38	16524.	29	12919.	32	19474.
SALEABLE PRODUCT PROCESS % OF TOTAL MW		8		6		7		11		8

NOTE: 28 UNITS ARE UNDECIDED AND ARE NOT INCLUDED IN THIS TABLE

SECTION 7
SUMMARY OF OPERATIONAL FGD SYSTEMS BY PROCESS AND UNIT

PROCESS/ UNIT NAME	UNIT NO.	CAPACITY MW	INITIAL STARTUP	COMMERCIAL STARTUP
CITRATE				
G.F. WEATON	1	60.	11/79	1/80
		60.		
DUAL ALKALI				
A.B. BROWN	1	265.	4/79	4/79
CANE RUN	6	299.	4/79	0/ 0
NEWTON	1	617.	9/79	12/79
		1181.		
LIME				
BRUCE MANSFIELD	1	917.	12/75	6/76
BRUCE MANSFIELD	2	917.	7/77	0/ 0
BRUCE MANSFIELD	3	917.	10/80	6/80
CANE RUN	4	188.	8/76	8/77
CANE RUN	5	200.	12/77	7/78
CONESVILLE	5	411.	1/77	2/77
CONESVILLE	6	411.	6/78	0/ 0
ELRAMA	1-4	510.	10/75	10/75
GREEN	1	242.	12/79	12/79
GREEN RIVER	1-3	64.	9/75	6/76
HAWTHORN	3	90.	11/72	0/ 0
HAWTHORN	4	90.	8/72	0/ 0
HUNTER	1	360.	5/79	0/ 0
HUNTER	2	360.	6/80	0/ 0
HUNTINGTON	1	366.	5/78	0/ 0
MILL CREEK	3	442.	8/78	3/79
PADDY'S RUN	6	72.	4/73	0/ 0
PHILLIPS	1-6	408.	7/73	0/ 0
PLEASANTS	1	618.	3/79	0/ 0
		7583.		
LIMESTONE				
APACHE	2	97.	8/78	1/79
APACHE	3	97.	6/79	4/79
CHOLLA	1	119.	10/73	12/73
CHOLLA	2	264.	4/78	0/ 0
CORONADO	1	280.	11/79	12/79
CRAIG	2	447.	12/79	5/80
DUCK CREEK	1	416.	7/76	8/78
JEFFREY	1	540.	8/78	0/ 0
JEFFREY	2	490.	4/80	1/80
LA CYGNE	1	874.	2/73	6/73
LAWRENCE	4	125.	1/76	0/ 0
LAWRENCE	5	420.	11/71	0/ 0
MARION	4	184.	5/79	5/79
MARTIN LAKE	1	595.	4/77	10/78
MARTIN LAKE	2	595.	5/78	0/ 0
MARTIN LAKE	3	595.	2/79	0/ 0
MONTICELLO	3	800.	5/78	10/78
PETERSBURG	3	532.	12/77	12/77
POWERTON	51	450.	4/80	12/80
R.D. MORROW	1	124.	8/78	8/78
R.D. MORROW	2	124.	6/79	6/79
SOUTHWEST	1	194.	4/77	0/ 0
TOMBIGBEE	2	179.	9/78	9/78
TOMBIGBEE	3	179.	6/79	6/79
WIDOWS CREEK	8	550.	5/77	1/78
WINYAH	2	140.	7/77	0/ 0
WINYAH	3	280.	5/80	6/80
		9691.		

THIS TABLE IDENTIFIES UNITS IN ALPHABETICAL ORDER.
RESPECTIVE COMPANIES CAN BE FOUND IN SECTION 1.

SECTION 7

SUMMARY OF OPERATIONAL FGD SYSTEMS BY PROCESS AND UNIT

PROCESS/ UNIT NAME	UNIT NO.	CAPACITY MW	INITIAL STARTUP	COMMERCIAL STARTUP
LIMESTONE/ALKALINE FLYASH				
SHERBURNE	1	740.	3/76	5/76
SHERBURNE	2	740.	4/77	4/77
		1480.		
LIME/ALKALINE FLYASH				
CLAY BOSWELL	4	475.	4/80	0/ 0
COAL CREEK	1	327.	8/79	0/ 0
COLSTRIP	1	360.	9/75	11/75
COLSTRIP	2	360.	5/76	10/76
FOUR CORNERS	1	175.	11/79	0/ 0
FOUR CORNERS	2	175.	11/79	0/ 0
FOUR CORNERS	3	229.	11/79	0/ 0
MILTON R. YOUNG	2	185.	9/77	6/78
		2286.		
LIME/LIMESTONE				
SHAWNEE	10A	10.	4/72	0/ 0
SHAWNEE	10B	10.	4/72	0/ 0
		20.		
SODIUM CARBONATE				
JIM BRIDGER	4	550.	9/79	2/80
REID GARDNER	1	125.	4/74	0/ 0
REID GARDNER	2	125.	4/74	0/ 0
REID GARDNER	3	125.	6/76	7/76
		925.		
WELLMAN LORD				
DEAN H. MITCHELL	11	115.	7/76	6/77
DELAWARE CITY	1	60.	5/80	5/80
DELAWARE CITY	2	60.	5/80	5/80
DELAWARE CITY	3	60.	5/80	5/80
SAN JUAN	1	361.	4/78	0/ 0
SAN JUAN	2	350.	8/78	0/ 0
SAN JUAN	3	534.	12/79	0/ 0
		1540.		
TOTAL		24766.		

SECTION 9
SUMMARY OF END-PRODUCT DISPOSAL PRACTICES FOR OPERATIONAL FGD SYSTEMS

PROCESS/ UNIT NAME	UNIT NO	THROWAWAY		BYPRODUCT	
		STABILIZED	UNSTABILIZED	TYPE	DISPOSITION
CITRATE					
G.F. WEATON	1			ELEMENTAL SULFUR	
DUAL ALKALI					
A.B. BROWN	1	LANDFILL			
CANE RUN	6	LANDFILL			
NEWTON	1				
LIME					
BRUCE MANSFIELD	1	LANDFILL			
BRUCE MANSFIELD	2	LANDFILL			
BRUCE MANSFIELD	3				
CANE RUN	4	LINED POND			
CANE RUN	5	LINED POND			
CONESVILLE	5	POND			
CONESVILLE	6	POND			
ELRAMA	1-4	LANDFILL			
GREEN	1				
GREEN RIVER	1-3		LINED POND		
HAWTHORN	3	POND			
HAWTHORN	4	POND			
HUNTER	1	POND			
HUNTER	2	POND			
HUNTINGTON	1	LANDFILL			
MILL CREEK	3	POND			
PADDY'S RUN	6	POND			
PHILLIPS	1-6	LANDFILL			
PLEASANTS	1				
LIMESTONE					
APACHE	2		POND		
APACHE	3		POND		
CHOLLA	1		POND		
CHOLLA	2		UNLINED POND		
CORONADO	1		LINED POND		
CRAIG	2		MINEFILL		TO WASTE
DUCK CREEK	1		LINED POND		
JEFFREY	1	POND			
JEFFREY	2	LINED POND			
LA CYGNE	1		UNLINED POND		
LAWRENCE	4	POND			
LAWRENCE	5	POND			
MARION	4	LANDFILL			
MARTIN LAKE	1	LANDFILL			
MARTIN LAKE	2	LANDFILL			
MARTIN LAKE	3	LANDFILL			
MONTICELLO	3	LANDFILL			
PETERSBURG	3	LANDFILL			
POWERTON	51	LANDFILL			
R.D. MORROW	1	LANDFILL			
R.D. MORROW	2	LANDFILL			
SOUTHWEST	1	LANDFILL			
TOMBIGBEE	2	LINED POND		CASO3-CASO4	POND
TOMBIGBEE	3	LINED POND		CASO3-CASO4	POND
WIDOWS CREEK	8		POND		
WINYAH	2		POND		
WINYAH	3				
LIMESTONE/ALKALINE FLYASH					
SHERBURNE	1	LINED POND			
SHERBURNE	2	LINED POND			

EPA UTILITY FGD SURVEY: APRIL - JUNE 1980

SECTION 8
SUMMARY OF END-PRODUCT DISPOSAL PRACTICES FOR OPERATIONAL FGD SYSTEMS

PROCESS/ UNIT NAME	UNIT NO	THROWAWAY		BYPRODUCT	
		STABILIZED	UNSTABILIZED	TYPE	DISPOSITION
LIME/ALKALINE FLYASH					
CLAY BOSWELL	4		LINED POND		
COAL CREEK	1	LINED POND			
COLSTRIP	1		POND		
COLSTRIP	2		POND		
FOUR CORNERS	1				
FOUR CORNERS	2				
FOUR CORNERS	3				
MILTON R. YOUNG	2		MINEFILL		
LIME/LIMESTONE					
SHAWNEE	10A				
SHAWNEE	10B				
SODIUM CARBONATE					
JIM BRIDGER	4		POND		
REID GARDNER	1		LINED POND		
REID GARDNER	2		LINED POND		
REID GARDNER	3		LINED POND		
WELLMAN LORD					
DEAN H. MITCHELL	11			ELEMENTAL SULFUR	
DELAWARE CITY	1	LINED POND		SULFURIC ACID	SALES AND INTERNAL U
DELAWARE CITY	2	LINED POND		SULFURIC ACID	SALES AND INTERNAL U
DELAWARE CITY	3	LINED POND		SULFURIC ACID	SALES AND INTERNAL U
SAN JUAN	1			ELEMENTAL SULFUR	MARKETED
SAN JUAN	2			ELEMENTAL SULFUR	MARKETED
SAN JUAN	3			SULFURIC ACID	MARKETED

SECTION 9
SUMMARY OF FGD SYSTEMS IN OPERATION

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
ALABAMA ELECTRIC COOP TOMBIGBEE	2	NEW	179.0	LIMESTONE PEABODY PROCESS SYSTEMS	9/78
ALABAMA ELECTRIC COOP TOMBIGBEE	3	NEW	179.0	LIMESTONE PEABODY PROCESS SYSTEMS	6/79
ARIZONA ELECTRIC POWER COOP APACHE	2	NEW	97.5	LIMESTONE RESEARCH-COTTRELL	8/78
ARIZONA ELECTRIC POWER COOP APACHE	3	NEW	97.5	LIMESTONE RESEARCH-COTTRELL	6/79
ARIZONA PUBLIC SERVICE CHOLLA	1	RETROFIT	119.0	LIMESTONE RESEARCH-COTTRELL	10/73
ARIZONA PUBLIC SERVICE CHOLLA	2	NEW	264.0	LIMESTONE RESEARCH-COTTRELL	4/78
ARIZONA PUBLIC SERVICE FOUR CORNERS	1	RETROFIT	175.0	LIME/ALKALINE FLYASH CHEMICO DIVISION, ENVIROTECH	11/79
ARIZONA PUBLIC SERVICE FOUR CORNERS	2	RETROFIT	175.0	LIME/ALKALINE FLYASH CHEMICO DIVISION, ENVIROTECH	11/79
ARIZONA PUBLIC SERVICE FOUR CORNERS	3	RETROFIT	229.0	LIME/ALKALINE FLYASH CHEMICO DIVISION, ENVIROTECH	11/79
BIG RIVERS ELECTRIC GREEN	1	NEW	242.0	LIME AMERICAN AIR FILTER	12/79
CENTRAL ILLINOIS LIGHT DUCK CREEK	1	NEW	416.0	LIMESTONE ENVIRONEERING, RILEY STOKER	7/76
CENTRAL ILLINOIS PUBLIC SERV NEWTON	1	NEW	617.0	DUAL ALKALI BUELL DIVISION, ENVIROTECH	9/79
COLORADO UTE ELECTRIC ASSN. CRAIG	2	NEW	447.0	LIMESTONE PEABODY PROCESS SYSTEMS	12/79
COLUMBUS & SOUTHERN OHIO ELEC. CONESVILLE	5	NEW	411.0	LIME AIR CORRECTION DIVISION, UOP	1/77
COLUMBUS & SOUTHERN OHIO ELEC. CONESVILLE	6	NEW	411.0	LIME AIR CORRECTION DIVISION, UOP	6/78
COMMONWEALTH EDISON POWERTON	51	RETROFIT	450.0	LIMESTONE AIR CORRECTION DIVISION, UOP	4/80
COOPERATIVE POWER ASSOCIATION COAL CREEK	1	NEW	327.0	LIME/ALKALINE FLYASH COMBUSTION ENGINEERING	8/79
DELMARVA POWER & LIGHT DELAWARE CITY	1	RETROFIT	60.0	WELLMAN LORD DAVY MCKEE	5/80
DELMARVA POWER & LIGHT DELAWARE CITY	2	RETROFIT	60.0	WELLMAN LORD DAVY MCKEE	5/80
DELMARVA POWER & LIGHT DELAWARE CITY	3	RETROFIT	60.0	WELLMAN LORD DAVY MCKEE	5/80
DUQUESNE LIGHT ELRAMA	1-4	RETROFIT	510.0	LIME CHEMICO DIVISION, ENVIROTECH	10/75
DUQUESNE LIGHT PHILLIPS	1-6	RETROFIT	408.0	LIME CHEMICO DIVISION, ENVIROTECH	7/73
INDIANAPOLIS POWER & LIGHT PETERSBURG	3	NEW	532.0	LIMESTONE AIR CORRECTION DIVISION, UOP	12/77
KANSAS CITY POWER & LIGHT HAWTHORN	3	RETROFIT	90.0	LIME COMBUSTION ENGINEERING	11/72

SECTION 9
SUMMARY OF FGD SYSTEMS IN OPERATION

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
KANSAS CITY POWER & LIGHT HAWTHORN	4	RETROFIT	90.0	LIME COMBUSTION ENGINEERING	8/72
KANSAS CITY POWER & LIGHT LA CYGNE	1	NEW	874.0	LIMESTONE BABCOCK & WILCOX	2/73
KANSAS POWER & LIGHT JEFFREY	1	NEW	540.0	LIMESTONF COMBUSTION ENGINEERING	8/78
KANSAS POWER & LIGHT JEFFREY	2	NEW	490.0	LIMESTONE COMBUSTION ENGINEERING	4/80
KANSAS POWER & LIGHT LAWRENCE	4	RETROFIT	125.0	LIMESTONE COMBUSTION ENGINEERING	1/76
KANSAS POWER & LIGHT LAWRENCE	5	RETROFIT	420.0	LIMESTONE COMBUSTION ENGINEERING	11/71
KENTUCKY UTILITIES GREEN RIVER	1-3	RETROFIT	64.0	LIME AMERICAN AIR FILTER	9/75
LOUISVILLE GAS & ELECTRIC CANE RUN	4	RETROFIT	188.0	LIME AMERICAN AIR FILTER	8/76
LOUISVILLE GAS & ELECTRIC CANE RUN	5	RETROFIT	200.0	LIME COMBUSTION ENGINEERING	12/77
LOUISVILLE GAS & ELECTRIC CANE RUN	6	RETROFIT	299.0	DUAL ALKALI ADL/COMBUSTION EQUIP ASSOCIATE	4/79
LOUISVILLE GAS & ELECTRIC MILL CREEK	3	NEW	442.0	LIME AMERICAN AIR FILTER	8/78
LOUISVILLE GAS & ELECTRIC PADDY'S RUN	6	RETROFIT	72.0	LIME COMBUSTION ENGINEERING	4/73
MINNESOTA POWER & LIGHT CLAY BOSWELL	4	NEW	475.0	LIME/ALKALINE FLYASH PEABODY PROCESS SYSTEMS	4/80
MINNKOTA POWER COOPERATIVE MILTON R. YOUNG	2	NEW	185.0	LIME/ALKALINE FLYASH ADL/COMBUSTION EQUIP ASSOCIATE	9/77
MONONGAHELA POWER PLEASANTS	1	NEW	618.0	LIME BABCOCK & WILCOX	3/79
MONTANA POWER COLSTRIP	1	NEW	360.0	LIME/ALKALINE FLYASH ADL/COMBUSTION EQUIP ASSOCIATE	9/75
MONTANA POWER COLSTRIP	2	NEW	360.0	LIME/ALKALINE FLYASH ADL/COMBUSTION EQUIP ASSOCIATE	5/76
NEVADA POWER REID GARDNER	1	RETROFIT	125.0	SODIUM CARBONATE ADL/COMBUSTION EQUIP ASSOCIATE	4/74
NEVADA POWER REID GARDNER	2	RETROFIT	125.0	SODIUM CARBONATE ADL/COMBUSTION EQUIP ASSOCIATE	4/74
NEVADA POWER REID GARDNER	3	NEW	125.0	SODIUM CARBONATE ADL/COMBUSTION EQUIP ASSOCIATE	6/76
NORTHERN INDIANA PUB SERVICE DEAN H. MITCHELL	11	RETROFIT	115.0	WELLMAN LORD DAVY MCKEE	7/76
NORTHERN STATES POWER SHERBURNE	1	NEW	740.0	LIMESTONE/ALKALINE FLYASH COMBUSTION ENGINEERING	3/76
NORTHERN STATES POWER SHERBURNE	2	NEW	740.0	LIMESTONE/ALKALINE FLYASH COMBUSTION ENGINEERING	4/77
PACIFIC POWER & LIGHT JIM BRIDGER	4	NEW	550.0	SODIUM CARBONATE AIR CORRECTION DIVISION, UOP	9/79

SECTION 9
SUMMARY OF FGD SYSTEMS IN OPERATION

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
PENNSYLVANIA POWER BRUCE MANSFIELD	1	NEW	917.0	LIME CHEMICO DIVISION, ENVIROTECH	12/75
PENNSYLVANIA POWER BRUCE MANSFIELD	2	NEW	917.0	LIME CHEMICO DIVISION, ENVIROTECH	7/77
PENNSYLVANIA POWER BRUCE MANSFIELD	3	NEW	917.0	LIME PULLMAN KELLOGG	10/80
PUBLIC SERVICE OF NEW MEXICO SAN JUAN	1	RETROFIT	361.0	WELLMAN LORD DAVY MCKEE	4/78
PUBLIC SERVICE OF NEW MEXICO SAN JUAN	2	RETROFIT	350.0	WELLMAN LORD DAVY MCKEE	8/78
PUBLIC SERVICE OF NEW MEXICO SAN JUAN	3	NEW	534.0	WELLMAN LORD DAVY MCKEE	12/79
SALT RIVER PROJECT CORONADO	1	NEW	280.0	LIMESTONE PULLMAN KELLOGG	11/79
SOUTH CAROLINA PUBLIC SERVICE WINYAH	2	NEW	140.0	LIMESTONE BABCOCK & WILCOX	7/77
SOUTH CAROLINA PUBLIC SERVICE WINYAH	3	NEW	280.0	LIMESTONE BABCOCK & WILCOX	5/80
SOUTH MISSISSIPPI ELEC PWR R.D. MORROW	1	NEW	124.0	LIMESTONE ENVIRONEERING, RILEY STOKER	8/78
SOUTH MISSISSIPPI ELEC PWR R.D. MORROW	2	NEW	124.0	LIMESTONE ENVIRONEERING, RILEY STOKER	6/79
SOUTHERN ILLINOIS POWER COOP MARION	4	NEW	184.0	LIMESTONE BABCOCK & WILCOX	5/79
SOUTHERN INDIANA GAS & ELEC A.B. BROWN	1	NEW	265.0	DUAL ALKALI FMC	4/79
SPRINGFIELD CITY UTILITIES SOUTHWEST	1	NEW	194.0	LIMESTONE AIR CORRECTION DIVISION, UOP	4/77
ST. JOE ZINC G.F. WEATON	1	RETROFIT	60.0	CITRATE MORRISON & KNUDSEN/U.S.B.M.	11/79
TENNESSEE VALLEY AUTHORITY SHAWNEE	10A	RETROFIT	10.0	LIME/LIMESTONE AIR CORRECTION DIVISION, UOP	4/72
TENNESSEE VALLEY AUTHORITY SHAWNEE	10B	RETROFIT	10.0	LIME/LIMESTONE CHEMICO DIVISION, ENVIROTECH	4/72
TENNESSEE VALLEY AUTHORITY WIDOWS CREEK	8	RETROFIT	550.0	LIMESTONE TENNESSEE VALLEY AUTHORITY	5/77
TEXAS UTILITIES MARTIN LAKE	1	NEW	595.0	LIMESTONE RESEARCH-COTTRELL	4/77
TEXAS UTILITIES MARTIN LAKE	2	NEW	595.0	LIMESTONE RESEARCH-COTTRELL	5/78
TEXAS UTILITIES MARTIN LAKE	3	NEW	595.0	LIMESTONE RESEARCH-COTTRELL	2/79
TEXAS UTILITIES MONTICELLO	3	NEW	800.0	LIMESTONE CHEMICO DIVISION, ENVIROTECH	5/78
UTAH POWER & LIGHT HUNTER	1	NEW	360.0	LIME CHEMICO DIVISION, ENVIROTECH	5/79
UTAH POWER & LIGHT HUNTER	2	NEW	360.0	LIME CHEMICO DIVISION, ENVIROTECH	6/80

SECTION 9
SUMMARY OF FGD SYSTEMS IN OPERATION

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
UTAH POWER & LIGHT HUNTINGTON	1	NEW	366.0	LIME CHEMICO DIVISION, ENVIROTECH	5/78
TOTAL			24766.0		

SECTION 10
SUMMARY OF FGD SYSTEMS UNDER CONSTRUCTION

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
ARIZONA PUBLIC SERVICE CHOLLA	4	NEW	126.0	LIMESTONE RESEARCH-COTTRELL	6/81
ASSOCIATED ELECTRIC COOP THOMAS HILL	3	NEW	670.0	LIMESTONE PULLMAN KELLOGG	1/82
BASIN ELECTRIC POWER COOP ANTELOPE VALLEY	1	NEW	440.0	LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER	4/83
BASIN ELECTRIC POWER COOP LARAMIE RIVER	1	NEW	570.0	LIMESTONE RESEARCH-COTTRELL	7/80
BASIN ELECTRIC POWER COOP LARAMIE RIVER	2	NEW	570.0	LIMESTONE RESEARCH-COTTRELL	6/81
BASIN ELECTRIC POWER COOP LARAMIE RIVER	3	NEW	570.0	LIME/SPRAY DRYING BABCOCK & WILCOX	4/82
BIG RIVERS ELECTRIC GREEN	2	NEW	242.0	LIME AMERICAN AIR FILTER	11/80
CINCINNATI GAS & ELECTRIC EAST BEND	2	NEW	650.0	LIME BABCOCK & WILCOX	9/80
COLORADO UTE ELECTRIC ASSN. CRAIG	1	NEW	447.0	LIMESTONE PEABODY PROCESS SYSTEMS	7/80
COOPERATIVE POWER ASSOCIATION COAL CREEK	2	NEW	327.0	LIME/ALKALINE FLYASH COMBUSTION ENGINEERING	7/80
EAST KENTUCKY POWER COOP SPURLOCK	2	NEW	500.0	LIME ADL/COMBUSTION EQUIP ASSOCIATE	1/81
HOOSIER ENERGY MEROM	1	NEW	441.0	LIMESTONE MITSUBISHI HEAVY INDUSTRIES	5/82
HOOSIER ENERGY MEROM	2	NEW	441.0	LIMESTONE MITSUBISHI HEAVY INDUSTRIES	7/81
HOUSTON LIGHTING & POWER W.A. PARISH	8	NEW	492.0	LIMESTONE CHEMICO DIVISION, ENVIROTECH	11/82
INDIANAPOLIS POWER & LIGHT PETERSBURG	4	NEW	530.0	LIMESTONE RESEARCH-COTTRELL	10/84
LAKELAND UTILITIES MCINTOSH	3	NEW	364.0	LIMESTONE BABCOCK & WILCOX	8/81
LOUISVILLE GAS & ELECTRIC MILL CREEK	1	RETROFIT	358.0	LIME COMBUSTION ENGINEERING	12/80
LOUISVILLE GAS & ELECTRIC MILL CREEK	2	RETROFIT	350.0	LIME COMBUSTION ENGINEERING	12/81
LOUISVILLE GAS & ELECTRIC MILL CREEK	4	NEW	495.0	LIME AMERICAN AIR FILTER	7/81
MONONGAHELA POWER PLEASANTS	2	NEW	618.0	LIME BABCOCK & WILCOX	9/80
MONTANA POWER COLSTRIP	3	NEW	700.0	LIME/ALKALINE FLYASH ADL/COMBUSTION EQUIP ASSOCIATE	0/83
MONTANA POWER COLSTRIP	4	NEW	700.0	LIME/ALKALINE FLYASH ADL/COMBUSTION EQUIP ASSOCIATE	0/84
MONTANA-DAKOTA UTILITIES COYOTE	1	NEW	440.0	AQUEOUS CARBONATE/SPRAY DRYING WHEELABRATOR-FRYE/R.I.	3/81
NIAGARA MOHAWK POWER COOP CHARLES R. HUNTLEY	66	RETROFIT	100.0	AQUEOUS CARBONATE/SPRAY DRYING ROCKWELL INTERNATIONAL	4/82

SECTION 10
SUMMARY OF FGD SYSTEMS UNDER CONSTRUCTION

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
NORTHERN STATES POWER RIVERSIDE	6,7	RETROFIT	110.0	LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER	8/80
PHILADELPHIA ELECTRIC EDDYSTONE	1	RETROFIT	240.0	MAGNESIUM OXIDE UNITED ENGINEERS	12/82
PHILADELPHIA ELECTRIC EDDYSTONE	2	RETROFIT	334.0	MAGNESIUM OXIDE UNITED ENGINEERS	12/82
PUBLIC SERVICE OF NEW MEXICO SAN JUAN	4	NEW	534.0	WELLMAN LORD DAVY MCKEE	6/82
SALT RIVER PROJECT CORONADO	2	NEW	280.0	LIMESTONE PULLMAN KELLOGG	7/80
SAN MIGUEL ELECTRIC COOP SAN MIGUEL	1	NEW	400.0	LIMESTONE BABCOCK & WILCOX	10/80
SIKESTON BOARD OF MUNIC. UTIL. SIKESTON	1	NEW	235.0	LIMESTONE BABCOCK & WILCOX	1/81
SOUTH CAROLINA PUBLIC SERVICE WINYAH	4	NEW	280.0	LIMESTONE AMERICAN AIR FILTER	7/81
SPRINGFIELD WATER, LIGHT & PWR DALLMAN	3	NEW	205.0	LIMESTONE RESEARCH-COTTRELL	11/80
TENNESSEE VALLEY AUTHORITY PARADISE	1	RETROFIT	704.0	LIMESTONE CHEMICO DIVISION, ENVIROTECH	3/82
TENNESSEE VALLEY AUTHORITY PARADISE	2	RETROFIT	704.0	LIMESTONE CHEMICO DIVISION, ENVIROTECH	6/82
TENNESSEE VALLEY AUTHORITY WIDOWS CREEK	7	RETROFIT	575.0	LIMESTONE COMBUSTION ENGINEERING	9/81
TEXAS MUNICIPAL POWER AGENCY GIBBONS CREEK	1	NEW	400.0	LIMESTONE COMBUSTION ENGINEERING	1/82
TEXAS POWER & LIGHT SANDOW	4	NEW	382.0	LIMESTONE COMBUSTION ENGINEERING	9/80
TOTAL			16524.0		

SECTION 11
SUMMARY OF CONTRACT AWARDED FGD SYSTEMS

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
ARIZONA PUBLIC SERVICE FOUR CORNERS	4	RETROFIT	755.0	LIME UNITED ENGINEERS	0/82
ARIZONA PUBLIC SERVICE FOUR CORNERS	5	RETROFIT	755.0	LIME UNITED ENGINEERS	0/82
COLORADO UTE ELECTRIC ASSN. CRAIG	3	NEW	447.0	LIME/SPRAY DRYING BABCOCK & WILCOX	0/82
GRAND HAVEN BRD OF LIGHT & PWR J. B. SIMS	3	NEW	65.0	LIME BABCOCK & WILCOX	6/83
MICHIGAN S. CENTRAL PWR AGENCY PROJECT	1	NEW	55.0	LIMESTONE BABCOCK & WILCOX	4/82
MUSCATINE POWER & WATER MUSCATINE	9	NEW	166.0	LIMESTONE RESEARCH-COTTRELL	9/82
NORTHERN INDIANA PUB SERVICE SCHAHFER	17	NEW	421.0	DUAL ALKALI FMC	6/83
NORTHERN INDIANA PUB SERVICE SCHAHFER	18	NEW	421.0	DUAL ALKALI FMC	6/85
PHILADELPHIA ELECTRIC CROMBY	1	RETROFIT	150.0	MAGNESIUM OXIDE UNITED ENGINEERS	5/83
PLAINS ELECTRIC G & T COOP PLAINS ESCALANTE	1	NEW	233.0	LIMESTONE COMBUSTION ENGINEERING	12/83
PLATTE RIVER POWER AUTHORITY RAWHIDE	1	NEW	279.0	LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER	12/83
PUBLIC SERVICE INDIANA GIBSON	5	NEW	650.0	LIMESTONE PULLMAN KELLOGG	0/82
SEMINOLE ELECTRIC SEMINOLE	1	NEW	620.0	LIMESTONE PEABODY PROCESS SYSTEMS	3/83
SEMINOLE ELECTRIC SEMINOLE	2	NEW	620.0	LIMESTONE PEABODY PROCESS SYSTEMS	3/85
SOUTH CAROLINA PUBLIC SERVICE CROSS	1	NEW	500.0	LIMESTONE PEABODY PROCESS SYSTEMS	3/85
SOUTH CAROLINA PUBLIC SERVICE CROSS	2	NEW	500.0	LIMESTONE PEABODY PROCESS SYSTEMS	11/83
SOUTHWESTERN ELECTRIC POWER HENRY W. PIRKEY	1	NEW	720.0	LIMESTONE AIR CORRECTION DIVISION, UOP	12/84
SUNFLOWER ELECTRIC COOP HOLCOMB	1	NEW	347.0	LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER	0/83
TAMPA ELECTRIC BIG BEND	4	NEW	475.0	LIME/LIMESTONE RESEARCH-COTTRELL	12/84
TENNESSEE VALLEY AUTHORITY JOHNSONVILLE	1-10	RETROFIT	600.0	MAGNESIUM OXIDE ENVIRONEERING, RILEY STOKER	12/81
TEXAS POWER & LIGHT TWIN OAKS	1	NEW	750.0	LIMESTONE CHEMICO DIVISION, ENVIROTECH	8/84
TEXAS POWER & LIGHT TWIN OAKS	2	NEW	750.0	LIMESTONE CHEMICO DIVISION, ENVIROTECH	8/85
TEXAS UTILITIES MARTIN LAKE	4	NEW	750.0	LIMESTONE RESEARCH-COTTRELL	0/85
TUCSON ELECTRIC POWER SPRINGERVILLE	1	NEW	370.0	LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER	1/85

SECTION 11
SUMMARY OF CONTRACT AWARDED FGD SYSTEMS

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
TUCSON ELECTRIC POWER SPRINGERVILLE	2	NEW	370.0	LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER	10/86
UNITED POWER ASSOCIATION STANTON	1A	NEW	50.0	LIME/SPRAY DRYING RESEARCH-COTTRELL	1/82
UTAH POWER & LIGHT HUNTER	3	NEW	400.0	LIMESTONE CHEMICO DIVISION, ENVIROTECH	6/83
UTAH POWER & LIGHT HUNTER	4	NEW	400.0	LIMESTONE CHEMICO DIVISION, ENVIROTECH	3/85
WEST PENN POWER MITCHELL	33	RETROFIT	300.0	LIME CHEMICO DIVISION, ENVIROTECH	8/82
TOTAL			12919.0		

SECTION 12
SUMMARY OF PLANNED FGD SYSTEMS

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
LETTER OF INTENT SIGNED					
MIDDLE SOUTH UTILITIES ARKANSAS LIGNITE	5	NEW	890.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	1/86
MIDDLE SOUTH UTILITIES ARKANSAS LIGNITE	6	NEW	890.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	1/88
MIDDLE SOUTH UTILITIES UNASSIGNED	1	NEW	890.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/85
MIDDLE SOUTH UTILITIES UNASSIGNED	2	NEW	890.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/87
MIDDLE SOUTH UTILITIES WILTON	1	NEW	890.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/86
MIDDLE SOUTH UTILITIES WILTON	2	NEW	890.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/88
NEVADA POWER REID GARDNER	4	NEW	250.0	SODIUM CARBONATE COMBUSTION EQUIPMENT ASSOCIATE	4/83
TOTAL			890.0		
REQUESTING/EVALUATING BIDS					
BASIN ELECTRIC POWER COOP ANTELOPE VALLEY	2	NEW	440.0	LIME/SPRAY DRYING VENDOR NOT SELECTED	10/85
CENTRAL ILLINOIS LIGHT DUCK CREEK	2	NEW	450.0	LIMESTONE VENDOR NOT SELECTED	1/86
DESERET GEN & TRANS COOP MOON LAKE	1	NEW	410.0	LIMESTONE VENDOR NOT SELECTED	9/84
DESERET GEN & TRANS COOP MOON LAKE	2	NEW	410.0	LIMESTONE VENDOR NOT SELECTED	0/88
GENERAL PUBLIC UTILITIES COHO	1	NEW	690.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	5/91
GENERAL PUBLIC UTILITIES SEWARD	7	NEW	690.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	5/87
HOUSTON LIGHTING & POWER LIMESTONE	1	NEW	750.0	LIMESTONE VENDOR NOT SELECTED	2/85
HOUSTON LIGHTING & POWER LIMESTONE	2	NEW	750.0	LIMESTONE VENDOR NOT SELECTED	2/86
IOWA ELECTRIC LIGHT & PWR GUTHRIE CO.	1	NEW	720.0	LIMESTONE VENDOR NOT SELECTED	10/84
MARQUETTE BOARD OF LIGHT & PWR SHIRAS	3	NEW	44.0	LIME/SPRAY DRYING VENDOR NOT SELECTED	10/82
NEVADA POWER WARNER VALLEY	1	NEW	295.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	6/85
NEVADA POWER WARNER VALLEY	2	NEW	295.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	6/86
NEW YORK STATE ELEC & GAS SOMERSET	1	NEW	870.0	LIMESTONE VENDOR NOT SELECTED	6/84
NORTHERN STATES POWER SHERBURNE	3	NEW	860.0	LIMESTONE VENDOR NOT SELECTED	5/85
TEXAS UTILITIES FOREST GROVE	1	NEW	750.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/81
TOTAL			440.0		

SECTION 12
SUMMARY OF PLANNED FGD SYSTEMS

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
CONSIDERING FGD SYSTEMS					
BIG RIVERS ELECTRIC D. B. WILSON	1	NEW	440.0	LIME VENDOR NOT SELECTED	11/84
BIG RIVERS ELECTRIC D. B. WILSON	2	NEW	440.0	LIME VENDOR NOT SELECTED	0/85
CAJUN ELECTRIC POWER COOP BIG CAJUN 3	1	NEW	540.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/85
CENTRAL MAINE POWER SEARS ISLAND	1	NEW	600.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	1/89
CINCINNATI GAS & ELECTRIC EAST BEND	1	NEW	650.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/ 0
COLUMBUS & SOUTHERN OHIO ELEC. POSTON	5	NEW	375.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	8/86
COLUMBUS & SOUTHERN OHIO ELEC. POSTON	6	NEW	375.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/89
DELMARVA POWER & LIGHT VIENNA	9	NEW	550.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	6/87
EAST KENTUCKY POWER COOP J. K. SMITH	1	NEW	650.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	1/85
EAST KENTUCKY POWER COOP J. K. SMITH	2	NEW	650.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	1/87
GENERAL PUBLIC UTILITIES COAL	1	NEW	625.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	12/92
GENERAL PUBLIC UTILITIES COAL	2	NEW	625.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	5/94
GENERAL PUBLIC UTILITIES COAL	3	NEW	625.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	12/95
GENERAL PUBLIC UTILITIES COAL	4	NEW	625.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	5/97
INDIANAPOLIS POWER & LIGHT PATRIOT	1	NEW	650.0	LIMESTONE VENDOR NOT SELECTED	0/87
INDIANAPOLIS POWER & LIGHT PATRIOT	2	NEW	650.0	LIMESTONE VENDOR NOT SELECTED	0/87
INDIANAPOLIS POWER & LIGHT PATRIOT	3	NEW	650.0	LIMESTONE VENDOR NOT SELECTED	0/87
JACKSONVILLE ELECT. AUTHORITY NEW PROJECT	1	NEW	600.0	LIMESTONE VENDOR NOT SELECTED	0/85
JACKSONVILLE ELECT. AUTHORITY NEW PROJECT	2	NEW	600.0	LIMESTONE VENDOR NOT SELECTED	0/87
LANSING BOARD OF WATER & LIGHT ERICKSON	2	NEW	160.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	1/87
LOS ANGELES DEPT OF WTR & PWR INTERMOUNTAIN	1	NEW	820.0	LIME VENDOR NOT SELECTED	0/86
LOS ANGELES DEPT OF WTR & PWR INTERMOUNTAIN	2	NEW	820.0	LIME VENDOR NOT SELECTED	0/87
LOS ANGELES DEPT OF WTR & PWR INTERMOUNTAIN	3	NEW	820.0	LIME VENDOR NOT SELECTED	0/88
LOS ANGELES DEPT OF WTR & PWR INTERMOUNTAIN	4	NEW	820.0	LIME VENDOR NOT SELECTED	0/89

SECTION 12
SUMMARY OF PLANNED FGD SYSTEMS

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
LOUISVILLE GAS & ELECTRIC TRIMBLE COUNTY	1	NEW	575.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	7/85
LOUISVILLE GAS & ELECTRIC TRIMBLE COUNTY	2	NEW	575.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	7/88
NEBRASKA PUBLIC POWER DISTRICT FOSSIL III	1	NEW	650.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	3/87
NEVADA POWER HARRY ALLEN	1	NEW	500.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	6/86
NEVADA POWER HARRY ALLEN	2	NEW	500.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	6/87
NEVADA POWER HARRY ALLEN	3	NEW	500.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	6/88
NEVADA POWER HARRY ALLEN	4	NEW	500.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	6/89
PACIFIC GAS & ELECTRIC MONTEZUMA	1	NEW	800.0	LIMESTONE VENDOR NOT SELECTED	6/89
PACIFIC GAS & ELECTRIC MONTEZUMA	2	NEW	800.0	LIMESTONE VENDOR NOT SELECTED	6/90
PWR AUTHORITY OF STATE OF NY FOSSIL		NEW	700.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	11/87
SALT RIVER PROJECT CORONADO	3	NEW	280.0	LIMESTONE VENDOR NOT SELECTED	1/88
SOUTHERN ILLINOIS POWER COOP MARION	5	NEW	300.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/86
TEXAS UTILITIES MILL CREEK	1	NEW	750.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/85
TEXAS UTILITIES MILL CREEK	2	NEW	750.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/86
TOTAL			440.0		

SECTION 13

TOTAL FGD UNITS AND CAPACITY (MW) INSTALLED BY YEAR

YEAR	NEW ON LINE NO.	NEW ON LINE MW	TERMINATED NO.	TERMINATED MW	TOTAL ON LINE NO.	TOTAL ON LINE MW
1968	1	140.	0	0.	1	140.
1969	0	0.	1	140.	0	0.
1971	1	420.	0	0.	1	420.
1972	6	485.	0	0.	7	905.
1973	4	1473.	1	175.	10	2203.
1974	2	250.	3	340.	9	2113.
1975	6	2018.	3	1637.	12	2494.
1976	8	2824.	3	850.	17	4468.
1977	10	4464.	1	47.	26	8885.
1978	13	4552.	0	0.	39	13437.
1979	20	6357.	2	143.	57	19652.
1980	21	7741.	0	0.	78	27393.
1981	13	5726.	0	0.	91	33119.
1982	20	8411.	0	0.	111	41530.
1983	12	4405.	0	0.	123	45935.
1984	10	5891.	0	0.	133	51826.
1985	18	10601.	0	0.	151	62427.
1986	11	6390.	0	0.	162	68817.
1987	15	9680.	0	0.	177	78497.
1988	7	4365.	0	0.	184	82862.
1989	6	3895.	0	0.	190	86757.
1990	1	800.	0	0.	191	87557.
1991	1	690.	0	0.	192	88247.
1992	1	625.	0	0.	193	88872.
1994	1	625.	0	0.	194	89497.
1995	1	625.	0	0.	195	90122.
1997	1	625.	0	0.	196	90747.
UNDEFINED	8	2612.				

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EPA UTILITY FGD SURVEY: APRIL - JUNE 1980

                                        SECTION 14
                  DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS
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COMPANY NAME                                    COMMONWEALTH EDISON
PLANT NAME                                      WILL COUNTY
UNIT NUMBER                                     1
CITY                                            ROMEOVILLE
STATE                                           ILLINOIS
GROSS UNIT GENERATING CAPACITY - MW               167.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW      137.0
EQUIVALENT SCRUBBED CAPACITY - MW               *******

** FUEL DATA
    FUEL TYPE                                   COAL
    FUEL GRADE                                  ******
    AVERAGE HEAT CONTENT - J/G                   22260.        (  9570 BTU/LB)
    AVERAGE ASH CONTENT - %                         7.40
    AVERAGE MOISTURE CONTENT - %                ********
    AVERAGE SULFUR CONTENT - %                      1.50
    AVERAGE CHLORIDE CONTENT - %                ********

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                        WET SCRUBBING
    PH CONTROL ADDITIVE                         LIMESTONE
    SYSTEM SUPPLIER                             BABCOCK & WILCOX
    NEW/RETROFIT                                RETROFIT
    ENERGY CONSUMPTION - %                      *******
    INITIAL START-UP DATE                        4/72
    COMMERCIAL START-UP DATE                     2/73
    TYPICAL SO2 REMOVAL - %                        76.00
    PARTICLE DESIGN REMOVAL EFFICIENCY - %         98.00

** ESP
    NUMBER                                       1
    TYPE                                        COLD SIDE

** PARTICLE SCRUBBER
    NUMBER                                       2
    TYPE                                        VENTURI


------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                 SO2  PART. HOURS HOURS HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

12/79  A             77.0        99.5                   57.5
       B             84.9       100.0                   57.8
       SYSTEM        77.0        99.5                   57.5                      744    431    428

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           ON DECEMBER 4, UNIT 1 CAME OFF LINE SO THAT THE AIR HEATER HOPPERS AND
                           PRECIPITATOR HOPPERS COULD BE EMPTIED OF CARBON CARRY-OVER AND DEBRIS.
                           DURING THIS OUTAGE THE SHOP REPAIRED A LEAK IN THE POND RETURN LINE.

                           ON DECEMBER 10, THE A-MODULE DEVELOPED A SERIOUS STEAM LEAK (25,000 MAKE-
                           UP) IN A LOWER REHEAT BUNDLE.  THE LEAKING BUNDLE HAD TO BE REMOVED AND
                           REPLACED.  THIS RESULTED IN A TWO DAY FORCED OUTAGE.  LATER IN THE MONTH
                           THE A-MODULE BLEW ANOTHER REHEATER TUBE FORCING THE BOILER OFF FOR AN
                           ADDITIONAL 25 HOURS AND 12 MINUTES.

                           THE A-MODULE WAS REMOVED FROM THE GAS PATH ON DECEMBER 29, FOR THREE HOURS
                           TO ALLOW THE MAINTENANCE SHOP TO WELD A LEAKING REHEATER FLANGE.

                           THE SO2 PLANT FORCED THE BOILER OFF TWICE THIS MONTH.  TOTAL FORCED OUTAGE
                           TIME ATTRIBUTED TO THE SCRUBBER WAS 54 HOURS AND 39 MINUTES.

 1/80  A             91.0        87.5                   63.0
       B             88.6        84.1                   60.6
       SYSTEM        88.6        84.1                   60.6                      744    536    451
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COMMONWEALTH EDISON: WILL COUNTY 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE FIRST SIX DAYS OF JANUARY, UNIT 1 BOILER WAS OFF THE SYSTEM BECAUSE OF A SLAG SCREEN TUBE LEAK. THE UNIT RETURNED TO SERVICE ON JANUARY 7.

ON JANUARY 16, THE UTILITY HAD TO DERATE UNIT 1 TO 50 MW BECAUSE THE REHEATER SECTIONS ON A AND B MODULES WERE PLUGGING. ON JANUARY 17, THE MODULES WERE TAKEN OUT OF THE GAS PATH TO BEGIN REMOVING AND CLEANING THE REHEATER SECTIONS WITH A HIGH PRESSURE (4000 PSI) WATER SPRAY. UNIT 1 BOILER WAS LEFT ON TO PROVIDE STABILITY FOR THE 138 KV SYSTEM.

IN THE PAST, ALL 42 BUNDLES CONSISTING OF SEVEN TUBES PER BUNDLE, HAD TO BE TAKEN OUTSIDE TO BE CLEANED ON A CONCRETE SLAB. IN THIS CASE SINCE TIME WAS THE MOST IMPORTANT FACTOR, A DIFFERENT APPROACH WAS USED. ONLY THE MIDDLE SIX BUNDLES ON EACH MODULE WERE REMOVED. THIS PROVIDED A LARGE ENOUGH SPACE SO THAT A LANCE WITH AN EXTENSION ON IT COULD BE USED TO CLEAN THE BOTTOM OF THE TWO TOP BUNDLES AND THE TOP OF THE TWO BOTTOM BUNDLES. THERE ARE DOORS THAT ALLOW EASY ACCESS TO THE TOP AND BOTTOM OF THE REHEATER. USING THIS METHOD, ONLY 12 OF THE 42 BUNDLES WERE REMOVED. IN THE PAST, THIS JOB HAS TAKEN AS LONG AS TWO WEEKS TO COMPLETE. USING THE NEW METHOD, ALL THE REHEATER BUNDLES WERE CLEANED IN 20 HOURS.

THE B-MODULE WAS FORCED OFF LINE ON TWO OTHER OCCASIONS IN JANUARY. BOTH THESE OUTAGES WERE CAUSED BY THE REHEATER (A COIL LEAK AND A FLANGE LEAK) TOTALING 18 HOURS AND 24 MINUTES.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	A	79.7	90.5		79.7						
	B	78.6	89.2		78.6						
	SYSTEM	74.1	84.2		74.1			696	613	516	

** PROBLEMS/SOLUTIONS/COMMENTS

SCRUBBER PROBLEMS IN FEBRUARY WERE CAUSED FROM LEAKS IN THE VENTURI SPRAY HEADER. THESE LEAKS DEVELOP WHERE THE RUBBER LINING INSIDE THE VENTURI PIPING HAS WORN AWAY SO THAT THE BARE METAL IS EXPOSED. THIS EXPOSED METAL IS THEN SUBJECT TO EROSION/CORROSION. THE LINING IS MOST LIKELY TO WEAR AT THE WELD HEAD OF THE SPRAY NOZZLE TO THE MAIN HEADER. ALL THE VENTURI SPRAY PIPING IS BEING REPLACED.

TUBE LEAKS IN THE STEAM COIL REHEAT SYSTEM CAUSED SCRUBBER PROBLEMS THIS MONTH. MODULE A WAS FORCED OUT ONCE AND MODULE B WAS FORCED OUT THREE TIMES. THESE TUBES WILL BE REPLACED DURING THE NEXT OUTAGE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	A	83.9			.0						
	A	83.9			.0						
	SYSTEM	83.9			.0			744	0	0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS OUT OF SERVICE FOR ALL OF MARCH DUE TO BOILER TUBE LEAKS IN THE REHEAT SECTION OF THE BOILER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	A	100.0	71.0		17.3						
	B	87.7	71.0		17.3						
	SYSTEM	93.9	71.4		17.3			720	175	125	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST 15 DAYS OF APRIL THE BOILER WAS OUT OF SERVICE DUE TO TUBE LEAKS IN THE AIR PREHEATER.

WHEN ATTEMPTS WERE MADE TO BRING THE BOILER ON LINE ON THE 16 THE B-MODULE OF THE SO2 SYSTEM DEVELOPED REHEATER TUBE LEAKS. THIS CAUSED A FORCED OUTAGE OF 53 HOURS AND 40 MINUTES.

WHEN ATTEMPTS WERE MADE TO RETURN THE BOILER TO SERVICE AGAIN, THE AUXILIARY LOW PRESSURE GOVENOR DEVELOPED AN OIL LEAK CAUSING A FOUR DAY OUTAGE, FOLLOWED BY ANOTHER REHEATER TUBE LEAK OUTAGE ON THE B MODULE. THIS

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------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
                                   OUTAGE LASTED 35 HOURS.  THE UNIT RETURNED TO SERVICE ON APRIL 24 AND
                                   WAS AVAILABLE FOR THE REST OF APRIL.

 5/80  SYSTEM                                                               744

      ** PROBLEMS/SOLUTIONS/COMMENTS

                                   INFORMATION WAS NOT AVAILABLE FOR THE MAY AND JUNE PERIODS.

 6/80  SYSTEM                                                               720
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SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	DETROIT EDISON
PLANT NAME	ST. CLAIR
UNIT NUMBER	6
CITY	BELLE RIVER
STATE	MICHIGAN
GROSS UNIT GENERATING CAPACITY - MW	260.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	*******
EQUIVALENT SCRUBBED CAPACITY - MW	130.0

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	22330.	(9600 BTU/LB)
AVERAGE ASH CONTENT - %	4.00	
AVERAGE MOISTURE CONTENT - %	22.60	
AVERAGE SULFUR CONTENT - %	.35	
AVERAGE CHLORIDE CONTENT - %	********	

** GENERAL EMISSION CONTROL SYSTEM DATA

GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	LIMESTONE
SYSTEM SUPPLIER	PEABODY PROCESS SYSTEMS
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	*******
INITIAL START-UP DATE	6/75
COMMERCIAL START-UP DATE	9/75
TYPICAL SO2 REMOVAL - %	90.00
PARTICLE DESIGN REMOVAL EFFICIENCY - %	99.70

** ESP

** MECHANICAL COLLECTOR

** PARTICLE SCRUBBER

NUMBER	2
TYPE	VENTURI

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE SCRUBBING SYSTEM OPERATED WITH BETTER THAN 80% AVAILABILITY DURING THE FIRST QUARTER OF 1980.

THE SCRUBBER ID FAN FAILED. THE BOLTS HOLDING PART OF THE SHROUDING IN PLACE SHEERED CAUSING THE PLATE TO FALL ONTO THE SHAFT.

BECAUSE OF ADDITIONAL PROBLEMS WITH THE A-S-H SUMP PUMPS, THE DENVER PUMPS INSTALLED TO ASSIST THE A-S-H PUMPS NOW CARRY THE ENTIRE LOAD. THE A-S-H PUMPS DRIVES HAVE BEEN DISCONNECTED. THE SLURRY CIRCULATES THROUGH THE THE NON-OPERATING A-S-H PUMPS TO THE DENVER PUMPS.

THE CONTINUAL PROBLEMS WITH THE LOUVER BY PASS DAMPERS WAS SOLVED BY DISCONNECTING THE EXTREME LOUVER AT EITHER END. THE DAMPERS OPERATE NOW WITH 12 OF THE 14 LOUVERS. THE UTILITY IS PLEASED WITH RECENT DAMPER OPERATIONS.

SOME RECENT SCRUBBER OUTAGES RESULTED FROM THE OCCASIONAL UNAVAILABILITY OF LIMESTONE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			

```
----------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                   THE SCRUBBER WAS OUT OF SERVICE THROUGH APRIL WHILE REPAIRS CONTINUED ON
                                   THE SCRUBBER ID FAN HOUSING.  BECAUSE BOILER OPERATED AT LOW LOAD THE
                                   SCRUBBER SERVICES WERE NOT REQUIRED IN APRIL.

 5/80  SYSTEM                                                                744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                   THE SCRUBBER WAS OUT OF SERVICE UNTIL MAY 21 WHEN THE FAN HOUSING REPAIR
                                   WAS COMPLETED.  THE SCRUBBER WAS SHUT DOWN AGAIN ON MAY 25 WITH A SCRUBBER
                                   ID FAN BEARING FAILURE.

 6/80  SYSTEM                                                                720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                   THE SCRUBBER WAS NOT OPERATED THROUGH JUNE BECAUSE PARTS FOR THE SCRUBBER
                                   ID FAN HAD NOT ARRIVED AT THE PLANT.  SCRUBBER SERVICE WAS NOT REQUIRED
                                   BECAUSE OF LOW BOILER LOAD.

                                   SCRUBBER REPAIRS AT ST CLAIR REQUIRE MORE OUTAGE TIME THAN ONE WOULD EXPECT
                                   BECAUSE THE UTILITY DOES NOT STOCK A GREAT DEAL OF PARTS FOR THE SCRUBBER.
                                   THE ST CLAIR 6 SCRUBBER IS SCHEDULED TO BE PERMANENTLY REMOVED FROM SERVICE
                                   IN SEPTEMBER 1981 WHEN THE NEW 100% CAPACITY ESP FACILITY CURRENTLY UNDER
                                   CONSTRUCTION IS COMPLETE.  AT PRESENT 50% OF THE FLUE GAS IS SCRUBBED AND
                                   50% PASSES THROUGH THE ESP.  DURING LOW LOAD PERIODS EITHER THE SCRUBBER OR
                                   ESP CAN BE SHUT DOWN.
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SECTION 14

DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	MINNESOTA POWER & LIGHT
PLANT NAME	CLAY BOSWELL
UNIT NUMBER	3
CITY	COHASSET
STATE	MINNESOTA
GROSS UNIT GENERATING CAPACITY - MW	364.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	347.1
EQUIVALENT SCRUBBED CAPACITY - MW	357.0

**** FUEL DATA**

FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	19538.	(8400 BTU/LB)
AVERAGE ASH CONTENT - %	9.00	
AVERAGE MOISTURE CONTENT - %	26.00	
AVERAGE SULFUR CONTENT - %	.92	
AVERAGE CHLORIDE CONTENT - %	.01	

**** GENERAL EMISSION CONTROL SYSTEM DATA**

GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	ALKALINE FLYASH
SYSTEM SUPPLIER	KREBS ENGINEERS
NEW/RETROFIT	NEW
ENERGY CONSUMPTION - %	.8
INITIAL START-UP DATE	1/73
COMMERCIAL START-UP DATE	5/73
TYPICAL SO2 REMOVAL - %	.00
PARTICLE DESIGN REMOVAL EFFICIENCY - %	98.70

**** FABRIC FILTER**

NUMBER	0
TYPE	NONE

**** ESP**

NUMBER	0

**** MECHANICAL COLLECTOR**

NUMBER	0

**** PARTICLE SCRUBBER**

NUMBER	1
TYPE	SPRAY IMPINGEMENT TOWER

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE SCRUBBER EXPERIENCED NO PROBLEMS DURING THE 1ST QUARTER OF 1980.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO SCRUBBER-RELATED OUTAGES OCCURRED DURING THE SECOND QUARTER OF 1980. DOWN TIME FOR MAINTENANCE WAS NOT REQUIRED SINCE GENERAL MAINTENANCE CAN BE PERFORMED ON THE MINNESOTA POWER AND LIGHT PAR-

EPA UTILITY FGD SURVEY: APRIL - JUNE 1980

MINNESOTA POWER & LIGHT: CLAY BOSWELL 3 (CONT.)

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--------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
                                TICLE SCRUBBERS WHILE THEY ARE IN SERVICE.
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SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	MINNESOTA POWER & LIGHT
PLANT NAME	SYL LASKIN
UNIT NUMBER	1
CITY	AURORA
STATE	MINNESOTA
GROSS UNIT GENERATING CAPACITY - MW	62.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	57.3
EQUIVALENT SCRUBBED CAPACITY - MW	58.0
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	20469. (8800 BTU/LB)
AVERAGE ASH CONTENT - %	9.00
AVERAGE MOISTURE CONTENT - %	26.70
AVERAGE SULFUR CONTENT - %	1.00
AVERAGE CHLORIDE CONTENT - %	.01
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	ALKALINE FLYASH
SYSTEM SUPPLIER	KREBS ENGINEERS
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	1.1
INITIAL START-UP DATE	6/71
COMMERCIAL START-UP DATE	6/71
TYPICAL SO2 REMOVAL - %	.00
PARTICLE DESIGN REMOVAL EFFICIENCY - %	98.70
** FABRIC FILTER	
NUMBER	0
TYPE	NONE
** ESP	
NUMBER	0
TYPE	NONE
** MECHANICAL COLLECTOR	
NUMBER	0
TYPE	NONE
** PARTICLE SCRUBBER	
NUMBER	1
TYPE	SPRAY IMPINGEMENT TOWER

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE SCRUBBER EXPERIENCED NO PROBLEMS DURING THE 1ST QUARTER OF 1980.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO SCRUBBER-RELATED OUTAGES OCCURRED DURING THE SECOND QUARTER OF 1980. DOWN TIME FOR MAINTENANCE WAS NOT REQUIRED SINCE GENERAL MAINTENANCE CAN BE PERFORMED ON THE MINNESOTA POWER AND LIGHT PAR-

```
-----------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD    CAP.
                                                               SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
                         TICLE SCRUBBERS WHILE THEY ARE IN SERVICE.
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                                   EPA UTILITY FGD SURVEY: APRIL - JUNE 1980

                                         SECTION 14
                      DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS
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  COMPANY NAME                                     MINNESOTA POWER & LIGHT
  PLANT NAME                                       SYL LASKIN
  UNIT NUMBER                                      2
  CITY                                             AURORA
  STATE                                            MINNESOTA
  GROSS UNIT GENERATING CAPACITY - MW                 62.0
  NET UNIT GENERATING CAPACITY W/SCRUBBER - MW        57.3
  EQUIVALENT SCRUBBED CAPACITY - MW                   58.0

  ** FUEL DATA
     FUEL TYPE                                     COAL
     FUEL GRADE                                    SUBBITUMINOUS
     AVERAGE HEAT CONTENT - J/G                     20469.        (  8800 BTU/LB)
     AVERAGE ASH CONTENT - %                            9.00
     AVERAGE MOISTURE CONTENT - %                      26.70
     AVERAGE SULFUR CONTENT - %                         1.00
     AVERAGE CHLORIDE CONTENT - %                        .01

  ** GENERAL EMISSION CONTROL SYSTEM DATA
     GENERAL PROCESS TYPE                          WET SCRUBBING
     PH CONTROL ADDITIVE                           ALKALINE FLYASH
     SYSTEM SUPPLIER                               KREBS ENGINEERS
     NEW/RETROFIT                                  RETROFIT
     ENERGY CONSUMPTION - %                             1.1
     INITIAL START-UP DATE                          6/71
     COMMERCIAL START-UP DATE                       6/71
     TYPICAL SO2 REMOVAL - %                             .00
     PARTICLE DESIGN REMOVAL EFFICIENCY - %            98.70

  ** FABRIC FILTER
     NUMBER                                         0
     TYPE                                          NONE

  ** ESP
     NUMBER                                         0
     TYPE                                          NONE

  ** MECHANICAL COLLECTOR
     NUMBER                                         0
     TYPE                                          NONE

  ** PARTICLE SCRUBBER
     NUMBER                                         1
     TYPE                                          SPRAY IMPINGEMENT TOWER


----------------------------------------PERFORMANCE DATA--------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                 SO2  PART. HOURS HOURS HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  SYSTEM                                                               744

 2/80  SYSTEM                                                               696

 3/80  SYSTEM                                                               744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                      THE UTILITY REPORTED THAT THE SCRUBBER EXPERIENCED NO PROBLEMS DURING THE
                      1ST QUARTER OF 1980.

 4/80  SYSTEM                                                               720

 5/80  SYSTEM                                                               744

 6/80  SYSTEM                                                               720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                      THE UTILITY REPORTED THAT NO SCRUBBER-RELATED OUTAGES OCCURRED DURING THE
                      SECOND QUARTER OF 1980.  DOWN TIME FOR MAINTENANCE WAS NOT REQUIRED SINCE
                      GENERAL MAINTENANCE CAN BE PERFORMED ON THE MINNESOTA POWER AND LIGHT PAR-
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-----------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
                          TICLE SCRUBBERS WHILE THEY ARE IN SERVICE.
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SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	MONTANA-DAKOTA UTILITIES CO.
PLANT NAME	LEWIS & CLARK
UNIT NUMBER	1
CITY	SIDNEY
STATE	MONTANA
GROSS UNIT GENERATING CAPACITY - MW	55.1
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	50.3
EQUIVALENT SCRUBBED CAPACITY - MW	55.1

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	LIGNITE	
AVERAGE HEAT CONTENT - J/G	15003.	(6450 BTU/LB)
AVERAGE ASH CONTENT - %	7.80	
AVERAGE MOISTURE CONTENT - %	36.20	
AVERAGE SULFUR CONTENT - %	.61	
AVERAGE CHLORIDE CONTENT - %	.03	

** GENERAL EMISSION CONTROL SYSTEM DATA

GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	LIMESTONE
SYSTEM SUPPLIER	RESEARCH-COTTRELL
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	2.2
INITIAL START-UP DATE	**/**
COMMERCIAL START-UP DATE	12/75
TYPICAL SO2 REMOVAL - %	.00
PARTICLE DESIGN REMOVAL EFFICIENCY - %	98.00

** MECHANICAL COLLECTOR

NUMBER	1
TYPE	MULTICLONE

** PARTICLE SCRUBBER

TYPE	VENTURI

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE JANUARY THROUGH MARCH PERIOD THE SCRUBBER WAS AVAILABLE MORE THAN 95% OF THE TIME.

THE EROSION PROBLEM MENTIONED DURING NOVEMBER CONTINUED. SECTIONS OF THE LINED CARBON STEEL COLUMN WALL SUPPORTING THE FLOODED DISC WERE RUPTURING, FILLING THE INNER CHAMBER WITH SLURRY AND ULTIMATELY RENDERING THE DISC MOVEMENT MECHANISM INOPERATIVE. THE UTILITY HAS MANAGED TO KEEP THE SCRUBBER OPERATING AS A STOP-GAP MEASURE BETWEEN UNIT SHUTDOWNS BY INSERTING A GARDEN HOSE IN THE COLUMN HOLES AND CONTINUALLY FLUSHING THE INNER CHAMBER. THE UTILITY HAS HAD SOME SUCCESS IN OTHER EROSION AREAS BY MAKING REPAIRS WITH A HASTELLOY MATERIAL. PLANS ARE BEING MADE TO JACKET THE ENTIRE DISC SUPPORT COLUMN WITH HASTELLOY G.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

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-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
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** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS SHUT DOWN FOR TWO WEEKS IN MAY.

CREWS INSPECTING THE SCRUBBING SYSTEM DISCOVERED THAT THE NINE FOOT SCRUBBER LINER SECTION AT THE BOTTOM OF THE CYCLONIC MIST ELIMINATOR WAS SEVERELY ERRODED. THE LINER HAS LASTED THREE YEARS. THE UTILITY CONSIDERS THIS A NORMAL MAINTENANCE PROBLEM. AT ONE TIME LINERS IN THIS SECTION WERE REPLACED EVERY SIX MONTHS. REPLACEMENT WORK ON THE LATEST FAILURE IS EXPECTED TO BEGIN BY JULY 21.

THE ENTIRE SCRUBBER COLUMN SUPPORTING THE DISC WHICH WAS ERODING AS REPORTED DURING THE PREVIOUS TWO QUARTERS HAS BEEN CLAD WITH HASTELLOY G.

THE UTILITY REPORTED THAT THE SCRUBBER HAS EXPERIENCED PLUGGING AT WET/DRY INTERFACES WITHIN THE STRUCTURE. IT APPEARS THAT THIS IS RELATED TO COAL SULFUR CONTENT. WHEN THE SULFUR CONTENT IS RELATIVELY HIGH (0.7 TO 1.0% AT LEWIS AND CLARK) THE PLUGGING DOES NOT OCCUR. LIMESTONE IS ADDED AS REQUIRED TO PREVENT THE OCCURRANCE OF LOW PH LEVELS. WHEN THE SULFUR CONTENT FALLS TO THE 0.3% RANGE THE PH RISES AS A RESULT OF THE ALKALINE CONSTITUENTS IN THE FLY ASH UNTIL SOFT SCALE PLUGGING RESULTS. THE UTILITY HAS CONSIDERED ADDING ACID TO STABILIZE THE PH WHEN THE COAL SULFUR CONTENT DROPS.

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	PACIFIC POWER & LIGHT	
PLANT NAME	DAVE JOHNSTON	
UNIT NUMBER	4	
CITY	GLENROCK	
STATE	WYOMING	
GROSS UNIT GENERATING CAPACITY - MW	330.0	
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	326.5	
EQUIVALENT SCRUBBED CAPACITY - MW	330.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	17282.	(7430 BTU/LB)
AVERAGE ASH CONTENT - %	12.00	
AVERAGE MOISTURE CONTENT - %	26.00	
AVERAGE SULFUR CONTENT - %	.50	
AVERAGE CHLORIDE CONTENT - %	.04	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PH CONTROL ADDITIVE	LIME/ALKALINE FLYASH	
SYSTEM SUPPLIER	CHEMICO DIVISION, ENVIROTECH	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	1.1	
INITIAL START-UP DATE	4/72	
COMMERCIAL START-UP DATE	**/**	
TYPICAL SO2 REMOVAL - %	********	
PARTICLE DESIGN REMOVAL EFFICIENCY - %	********	
** PARTICLE SCRUBBER		
NUMBER	3	
TYPE	VENTURI	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THE FIRST QUARTER OF 1980.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR PROBLEMS OCCURRED DURING THE SECOND QUARTER OF 1980.

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	POTOMAC ELECTRIC POWER
PLANT NAME	DICKERSON
UNIT NUMBER	1
CITY	DICKERSON
STATE	MARYLAND
GROSS UNIT GENERATING CAPACITY - MW	190.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	183.0
EQUIVALENT SCRUBBED CAPACITY - MW	*******

** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	******
AVERAGE HEAT CONTENT - J/G	27214. (11700 BTU/LB)
AVERAGE ASH CONTENT - %	14.00
AVERAGE MOISTURE CONTENT - %	********
AVERAGE SULFUR CONTENT - %	2.00
AVERAGE CHLORIDE CONTENT - %	********

** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	PROCESS NOT SELECTED
SYSTEM SUPPLIER	VENDOR NOT SELECTED
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	*******
INITIAL START-UP DATE	**/**
COMMERCIAL START-UP DATE	0/78
TYPICAL SO2 REMOVAL - %	********
PARTICLE DESIGN REMOVAL EFFICIENCY - %	99.00

** ESP	
TYPE	COLD SIDE

** PARTICLE SCRUBBER	
TYPE	VENTURI

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	100.0	100.0		100.0			744	744	744	
2/80	SYSTEM	94.3	95.8		94.3			696	685	656	
3/80	SYSTEM	100.0	100.0		100.0			744	744	744	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER OF 1980 ONLY ONE SCRUBBER OUTAGE OCCURRED. IN FEBRUARY OUTAGE TIME WAS NECESSARY TO REPAIR A SLURRY RECYCLE LINE LEAK.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

DICKERSON 1 SCRUBBER DEPENDABILITY FACTORS WERE UNAVAILABLE FOR THE APRIL-JUNE PERIOD. THESE FIGURES SHOULD BE AVAILABLE BY THE THIRD QUARTER REPORT. THE UTILITY REPORTED THAT THE FGD SYSTEM OPERATED THE ENTIRE SECOND QUARTER WITH ESSENTIALLY 100% AVAILABILITY. NO SCRUBBER-RELATED PROBLEMS WERE REPORTED.

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	POTOMAC ELECTRIC POWER
PLANT NAME	DICKERSON
UNIT NUMBER	2
CITY	DICKERSON
STATE	MARYLAND
GROSS UNIT GENERATING CAPACITY - MW	197.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	183.0
EQUIVALENT SCRUBBED CAPACITY - MW	*******

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	27214.	(11700 BTU/LB)
AVERAGE ASH CONTENT - %	14.00	
AVERAGE MOISTURE CONTENT - %	********	
AVERAGE SULFUR CONTENT - %	2.00	
AVERAGE CHLORIDE CONTENT - %	********	

** GENERAL EMISSION CONTROL SYSTEM DATA

GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	PROCESS NOT SELECTED
SYSTEM SUPPLIER	VENDOR NOT SELECTED
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	*******
INITIAL START-UP DATE	**/**
COMMERCIAL START-UP DATE	0/78
TYPICAL SO2 REMOVAL - %	********
PARTICLE DESIGN REMOVAL EFFICIENCY - %	99.00

** ESP

TYPE	COLD SIDE

** PARTICLE SCRUBBER

TYPE	VENTURI

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	95.4	96.4		95.4			744	736	710	

** PROBLEMS/SOLUTIONS/COMMENTS

IN JANUARY THE SCRUBBER WAS DOWN FOR THREE HOURS TO REPAIR A SLURRY RECYCLE LINE LEAK.

31 HOURS OF THE OUTAGE TIME IN JANUARY WAS NECESSARY TO REPAIR A RECYCLE PUMP.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	SYSTEM	100.0	100.0		100.0			696	696	696	
3/80	SYSTEM	96.9	96.9		96.9			744	744	721	

** PROBLEMS/SOLUTIONS/COMMENTS

IN MARCH THE SCRUBBER WAS DOWN FOR A SCRUBBER LINING WARRANTY INSPECTION. NO REPAIR WORK WAS NECESSARY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

DICKERSON 2 SCRUBBER DEPENDABILITY FACTORS WERE UNAVAILABLE FOR THE APRIL-JUNE PERIOD. THESE FIGURES SHOULD BE AVAILABLE BY THE THIRD QUARTER REPORT. THE UTILITY REPORTED THAT THE FGD SYSTEM OPERATED THE ENTIRE

EPA UTILITY FGD SURVEY: APRIL - JUNE 1980

POTOMAC ELECTRIC POWER: DICKERSON 2 (CONT.)

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-----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
                        SECOND QUARTER WITH ESSENTIALLY 100% AVAILABILITY.  NO SCRUBBER-RELATED
                        PROBLEMS WERE REPORTED.
```

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	POTOMAC ELECTRIC POWER	
PLANT NAME	DICKERSON	
UNIT NUMBER	3	
CITY	DICKERSON	
STATE	MARYLAND	
GROSS UNIT GENERATING CAPACITY - MW	190.0	
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	183.0	
EQUIVALENT SCRUBBED CAPACITY - MW	*******	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	27214.	(11700 BTU/LB)
AVERAGE ASH CONTENT - %	14.00	
AVERAGE MOISTURE CONTENT - %	********	
AVERAGE SULFUR CONTENT - %	2.00	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PH CONTROL ADDITIVE		
SYSTEM SUPPLIER		
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	9/75	
COMMERCIAL START-UP DATE	**/**	
TYPICAL SO2 REMOVAL - %	.00	
PARTICLE DESIGN REMOVAL EFFICIENCY - %	99.30	
** ESP		
NUMBER	1	
TYPE	COLD SIDE	
** PARTICLE SCRUBBER		
NUMBER	1	
TYPE	VENTURI	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	78.7	88.2		78.7			744	664	586	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE SCRUBBER WAS DOWN TO REPAIR THE FLAKEGLASS LINING.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	SYSTEM	100.0	100.0		100.0			696	696	696	
3/80	SYSTEM	100.0	100.0		100.0			744	744	744	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY AND MARCH THE SCRUBBER OPERATED WITH NO MAJOR PROBLEMS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT 3 SCRUBBER EXPERIENCED SOME DOWN TIME DURING THE APRIL-JUNE PERIOD AS A RESULT OF THE CONTINUING DETERIORATION OF THE SCRUBBER FLAKEGLASS LINING. THE UTILITY REPORTED THAT MAINTENANCE CREWS ARE PATCHING OLD PATCHES. A STUDY WILL BEGIN IN LATE JULY TO ESTABLISH THE OPTIMUM LINER MATERIAL AND APPLICATION STRATEGY FOR THE UNIT 3 SCRUBBING SYSTEM.

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	PUBLIC SERVICE OF COLORADO
PLANT NAME	ARAPAHOE
UNIT NUMBER	4
CITY	DENVER
STATE	COLORADO
GROSS UNIT GENERATING CAPACITY - MW	112.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	100.8
EQUIVALENT SCRUBBED CAPACITY - MW	11.2
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	23725. (10200 BTU/LB)
AVERAGE ASH CONTENT - %	9.30
AVERAGE MOISTURE CONTENT - %	13.70
AVERAGE SULFUR CONTENT - %	.95
AVERAGE CHLORIDE CONTENT - %	.01
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	ALKALINE FLYASH
SYSTEM SUPPLIER	AIR CORRECTION DIVISION, UOP
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	*******
INITIAL START-UP DATE	9/73
COMMERCIAL START-UP DATE	**/**
TYPICAL SO2 REMOVAL - %	********
PARTICLE DESIGN REMOVAL EFFICIENCY - %	********
** FABRIC FILTER	
NUMBER	0
TYPE	NONE
** ESP	
NUMBER	1
** MECHANICAL COLLECTOR	
NUMBER	1
** PARTICLE SCRUBBER	
NUMBER	1
TYPE	MOBILE PACKED TOWER

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE MODULE ISOLATION PROBLEMS CONTINUED THROUGH THE FIRST QUARTER OF 1980. USE OF THE CARBON STEEL DAMPERS HAS BEEN ABANDONED. THE PROGRAM FOR REPLACING THE DAMPERS HAS BEEN SUSPENDED INDEFINITELY. THE UNIT IS SHUTDOWN WHEN MAJOR SCRUBBER PROBLEMS OCCUR.

REHEATER STEAM TUBE LEAKS ARE STILL CAUSING PROBLEMS. THE SIX STEAM COILS ON THIS IN-LINE REHEAT SYSTEM, TWO OF WHICH ARE 316SS AND FOUR OF WHICH ARE CARBON STEEL, ARE EXPERIENCING CORROSION PROBLEMS. A SOLUTION TO THE PROBLEM HAS NOT YET BEEN DETERMINED.

IN FEBRUARY THE UTILITY REPLACED THE SCRUBBER BALLS AND GRIDS. THE OLD BALLS WERE REPLACED WITH THE NEW HOLLOW HARD PLASTIC-WALLED BALLS WITH NOTCHED SEAMS. THE GRIDS WERE ORIGINALLY 316L SS, CERAMIC, POLYPROPYLENE, AND RUBBER LINED CARBON STEEL, BUT HAVE BEEN REPLACED WITH 317L SS GRIDS.

PUBLIC SERVICE OF COLORADO: ARAPAHOE 4 (CONT.)

PERFORMANCE DATA

THE SCRUBBERS OPERATED CONTINUOUSLY THROUGHOUT THE QUARTER EXCEPT FOR THE BALL AND GRID REPLACEMENT DOWNTIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

BOTH BOILER AND SCRUBBERS OPERATED THE ENTIRE APRIL-JUNE PERIOD.

THE ISOLATION DAMPERS ARE STILL EFFECTIVELY INOPERABLE AND A REPLACEMENT PLAN AS YET HAS NOT BEEN REESTABLISHED.

THE UTILITY REPORTED THAT THE REHEATER TUBE LEAK PROBLEM CONTINUED THROUGH THE SECOND QUARTER. THE TUBES WILL BE ENTIRELY REPLACED WITH NEW 316L SS BUNDLES DURING THE NEXT SCHEDULED OUTAGE IN NOVEMBER AND DECEMBER. DURING THE SECOND QUARTER MORE TUBES WERE PLUGGED WHEN STEAM LEAKS OCCURRED. TO DATE ROUGHLY 50% OF THE TUBES ARE SEALED OFF AND ARE OUT OF SERVICE BECAUSE OF LEAKS THAT OCCURRED OVER THE PAST MONTHS.

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	PUBLIC SERVICE OF COLORADO
PLANT NAME	CHEROKEE
UNIT NUMBER	1
CITY	DENVER
STATE	COLORADO
GROSS UNIT GENERATING CAPACITY - MW	115.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	100.0
EQUIVALENT SCRUBBED CAPACITY - MW	102.2
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	23493. (10100 BTU/LB)
AVERAGE ASH CONTENT - %	12.50
AVERAGE MOISTURE CONTENT - %	11.30
AVERAGE SULFUR CONTENT - %	.65
AVERAGE CHLORIDE CONTENT - %	.01
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	ALKALINE FLYASH
SYSTEM SUPPLIER	AIR CORRECTION DIVISION, UOP
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	4.3
INITIAL START-UP DATE	6/73
COMMERCIAL START-UP DATE	**/**
TYPICAL SO2 REMOVAL - %	********
PARTICLE DESIGN REMOVAL EFFICIENCY - %	********
** FABRIC FILTER	
NUMBER	0
TYPE	NONE
** ESP	
NUMBER	1
** MECHANICAL COLLECTOR	
NUMBER	1
** PARTICLE SCRUBBER	
NUMBER	1
TYPE	MOBILE PACKED TOWER

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE SCRUBBERS OPERATED CONTINUOUSLY THROUGHOUT THE FIRST QUARTER OF 1980.

THE ISOLATION DAMPERS HAVE NOT CAUSED ANY PROBLEMS BECAUSE MODULE ISOLATION WAS NOT REQUIRED DURING THE PERIOD.

THE FANS ARE STILL EXPERIENCING EROSION PROBLEMS.

ON MAY 24 A BOILER/SCRUBBER OVERHAUL WILL BEGIN. DURING THIS TIME THE CARBON STEEL ISOLATION DAMPERS WILL BE REPLACED WITH 316 SS. THE NEW FANS WILL BE INSTALLED IN THE OLD HOUSINGS. THE NEW HIGH STRENGTH CARBON STEEL FANS WILL BE EQUIPPED WITH REPLACABLE CHROMIUM ALLOY WEAR PLATE BLADE TIPS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			

PUBLIC SERVICE OF COLORADO: CHEROKEE 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER AND SCRUBBING SYSTEM WERE TAKEN OUT OF SERVICE FOR A SCHEDULED OVERHAUL ON MAY 24. THE UNIT IS SCHEDULED TO START UP AGAIN ON JULY 25.

THE 1B ID FAN WAS SEVERELY ERRODED. THE FAN WAS REBUILT DURING THE OUTAGE.

THE OLD CARBON STEEL ISOLATION DAMPERS WERE REPLACED WITH 316 SS DAMPERS DURING THE CONTINUING MAY-JULY OUTAGE.

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	PUBLIC SERVICE OF COLORADO	
PLANT NAME	CHEROKEE	
UNIT NUMBER	4	
CITY	DENVER	
STATE	COLORADO	
GROSS UNIT GENERATING CAPACITY - MW	375.0	
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	350.0	
EQUIVALENT SCRUBBED CAPACITY - MW	356.4	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	23493.	(10100 BTU/LB)
AVERAGE ASH CONTENT - %	12.50	
AVERAGE MOISTURE CONTENT - %	11.30	
AVERAGE SULFUR CONTENT - %	.65	
AVERAGE CHLORIDE CONTENT - %	.01	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PH CONTROL ADDITIVE	ALKALINE FLYASH	
SYSTEM SUPPLIER	AIR CORRECTION DIVISION, UOP	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	6.7	
INITIAL START-UP DATE	7/74	
COMMERCIAL START-UP DATE	**/**	
TYPICAL SO2 REMOVAL - %	********	
PARTICLE DESIGN REMOVAL EFFICIENCY - %	********	
** FABRIC FILTER		
NUMBER	0	
TYPE	NONE	
** ESP		
NUMBER	1	
** MECHANICAL COLLECTOR		
NUMBER	1	
** PARTICLE SCRUBBER		
NUMBER	4	
TYPE	MOBILE PACKED TOWER	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

A BOILER/SCRUBBER OUTAGE BEGAN IN MID-MARCH AND IS SCHEDULED TO CONTINUE THROUGH EARLY MAY. THE OUTLET DUCT WORK IS BEING REBUILT INTERNALLY WITH FIBERGLASS FOR STRUCTURAL SUPPORT AND ACID RESISTANCE. WITH REGULAR MAINTENANCE THE UTILITY EXPECTS THIS TO PROVE TO BE A PERMANENT SOLUTION TO THE EROSION/CORROSION PROBLEM.

DURING THE OUTAGE A SECOND LAYER OF VERTICAL GRIDS IS BEING INSTALLED ON THE THREE LAYER MOBLE BED TOWER. THE VERTICAL GRIDS SHOULD CHECK THE POTENTIAL FOR SIDE TO SIDE BALL MIGRATION.

THE OLD FANS ARE BEING REPLACED WITH HIGH STRENGTH CARBON STEEL FANS HAVING REPLACABLE CHROMIUM ALLOY WEAR PLATE BLADE TIPS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			

PUBLIC SERVICE OF COLORADO: CHEROKEE 4 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER/SCRUBBER OVERHAUL WHICH BEGAN IN MID-MARCH CONTINUED THROUGH JUNE.

THE NEW FANS DESCRIBED DURING THE LAST REPORT PERIOD WERE INSTALLED IN TWO OF THE FOUR MODULES. NEW FANS WILL BE INSTALLED IN THE OTHER TWO MODULES DURING A SCHEDULED LATE SEPTEMBER OUTAGE UNLESS THE UTILITY HAS AN OPPORTUNITY TO MAKE THE REPLACEMENTS SOONER.

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                                         SECTION 14
                     DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS
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 COMPANY NAME                                        PUBLIC SERVICE OF COLORADO
 PLANT NAME                                          VALMONT
 UNIT NUMBER                                         5
 CITY                                                VALMONT
 STATE                                               COLORADO
 GROSS UNIT GENERATING CAPACITY - MW                   166.0
 NET UNIT GENERATING CAPACITY W/SCRUBBER - MW          157.0
 EQUIVALENT SCRUBBED CAPACITY - MW                     166.0

 ** FUEL DATA
      FUEL TYPE                                      COAL
      FUEL GRADE                                     SUBBITUMINOUS
      AVERAGE HEAT CONTENT - J/G                      25121.          ( 10800 BTU/LB)
      AVERAGE ASH CONTENT - %                            6.00
      AVERAGE MOISTURE CONTENT - %                      15.00
      AVERAGE SULFUR CONTENT - %                          .70
      AVERAGE CHLORIDE CONTENT - %                   ********

 ** GENERAL EMISSION CONTROL SYSTEM DATA
      GENERAL PROCESS TYPE                           WET SCRUBBING
      PH CONTROL ADDITIVE                            LIMESTONE/ALKALINE FLYASH
      SYSTEM SUPPLIER                                UOP/PUBLIC SERVICE OF COLORADO
      NEW/RETROFIT                                   RETROFIT
      ENERGY CONSUMPTION - %                            3.6
      INITIAL START-UP DATE                          11/71
      COMMERCIAL START-UP DATE                       10/74
      TYPICAL SO2 REMOVAL - %                          85.00
      PARTICLE DESIGN REMOVAL EFFICIENCY - %           95.00

 ** FABRIC FILTER
      NUMBER                                          0
      TYPE                                           NONE

 ** ESP
      NUMBER                                          1
      TYPE                                           COLD SIDE

 ** MECHANICAL COLLECTOR
      NUMBER                                          1

 ** PARTICLE SCRUBBER
      NUMBER                                          2
      TYPE                                           MOBILE PACKED TOWER


-----------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  A             98.5
       B             98.5
       SYSTEM        98.5
                                                                           744
 2/80  A             84.4
       B             94.9
       SYSTEM        89.7
                                                                           696
 3/80  A             90.8
       B             87.7
       SYSTEM        89.0
                                                                           744   615
      ** PROBLEMS/SOLUTIONS/COMMENTS

                    DURING THE FIRST QUARTER OF 1980, NO MAJOR PROBLEMS WERE ENCOUNTERED WITH
                    THE SCRUBBER.

 4/80  A             88.1
       B             88.1
       SYSTEM        88.1
                                                                           720   716
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PUBLIC SERVICE OF COLORADO: VALMONT 5 (CONT.)


-------------------------------------------PERFORMANCE DATA-----------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              THE SCRUBBER WAS SHUT DOWN ON APRIL 14 FOR A WEEK TO MAKE REPAIRS TO A HOLE
                              IN THE SCRUBBER RUBBER LINING, RECYCLE PUMP LININGS AND A STEAM REGULATOR
                              ON ONE OF THE REHEATERS.

 5/80  A             96.8
       B            100.0
       SYSTEM        98.4                                                       744   744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              NO PROBLEMS WERE REPORTED FOR MAY.

 6/80  A              8.0
       B              8.0
       SYSTEM         8.0                                                       720   720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              DURING JUNE THE SCRUBBER WAS FORCED OUT OF SERVICE WHEN AN INBOARD FAN
                              PEDISTLE BEARING FAILED.  THE BEARING SECTION WAS REBUILT.

                              WHILE FAN REPAIRS WERE IN PROGRESS EXTENSIVE MAINTENANCE WAS PERFORMED ON
                              THE SCRUBBER.  MAINTENANCE WORK INCLUDED COMPLETE BALL REPLACEMENT, ADDI-
                              TIONAL REPAIR WORK ON THE SCRUBBER LINER, REPAIR OF HOLES IN THE TOWER
                              SHELL AND OF A RUPTURED MIST ELIMINATOR WASH LINE AND THE REHEATER WAS
                              CLEANED.

                              DAMPER JAMMING AT VALMONT HAS OCCURRED PERIODICALLY.  SOMETIMES DAMPERS DO
                              NOT READILY CLOSE.  THE OPERATOR MUST MOVE THE DAMPER UP AND DOWN UNTIL THE
                              GUILLOTINE SEATS.  BECAUSE OF CONTINUOUS FLY ASH ACCUMULATION IT APPEARS
                              THAT THE DAMPERS MUST BE EXERCISED FREQUENTLY TO PREVENT JAMMING.
```

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	SOUTHWESTERN PUBLIC SERVICE
PLANT NAME	HARRINGTON
UNIT NUMBER	1
CITY	AMARILLO
STATE	TEXAS
GROSS UNIT GENERATING CAPACITY - MW	360.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	320.0
EQUIVALENT SCRUBBED CAPACITY - MW	360.0
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	19538. (8400 BTU/LB)
AVERAGE ASH CONTENT - %	5.00
AVERAGE MOISTURE CONTENT - %	27.10
AVERAGE SULFUR CONTENT - %	.42
AVERAGE CHLORIDE CONTENT - %	********
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	LIMESTONE
SYSTEM SUPPLIER	COMBUSTION ENGINEERING
NEW/RETROFIT	NEW
ENERGY CONSUMPTION - %	*******
INITIAL START-UP DATE	4/77
COMMERCIAL START-UP DATE	**/**
TYPICAL SO2 REMOVAL - %	50.00
PARTICLE DESIGN REMOVAL EFFICIENCY - %	99.00
** ESP	
NUMBER	1
TYPE	COLD SIDE
** PARTICLE SCRUBBER	
NUMBER	6
TYPE	MOBILE PACKED TOWER

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/79	SYSTEM							744			
11/79	SYSTEM							720			
12/79	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER THROUGH DECEMBER, TWO SPRAY PUMP MOTORS FAILED.

THE FRP FLUSH PIPING HAS FAILED CAUSING SOME LEAKING.

PLUGGING IN ONE MARBLE BED WAS ENCOUNTERED WHEN THE CHEMISTRY CONTROL WAS TEMPORARILY LOST.

THE CONE SHAPED EXPANDED METAL (316L SS) SCREENS COVERING THE BED DRAIN PIPES HAVE ERODED AWAY FROM BALL MOVEMENT. THE MARBLE BALLS HAVE BEEN DROPPING INTO THE RECYCLE TANK. WHERE THE UTILITY HAS REPLACED THE METAL SCREEN WITH EXPANDED PLASTIC SCREEN, EROSION HAS NOT OCCURRED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

SOUTHWESTERN PUBLIC SERVICE: HARRINGTON 1 (CONT.)

```
-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL    PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER OF 1980 THE MIST ELIMINATOR WASH PIPING RUPTURED CAUSING PLUGGING IN SCRUBBERS 4 AND 5. THE UTILITY PLANS TO REPLACE ALL FRP PIPING WITH STEEL. THE RUPTURE ON NO. 5 ALSO DAMAGED THE WATER SUPPLY HEADER.

THE MARBLE BED PLUGGING REPORTED DURING THE LAST QUARTER IS NOT YET COMPLETELY CLEARED. THE SOFT SCALE IS GRADUALLY GOING BACK INTO THE SOLUTION. THE PLATE AREA IS CLEAN.

THE DUCT BENEATH THE REHEATER TUBING ON ONE OF THE MODULES HAS CORRODED TO THE POINT THAT HOLES HAVE FORMED. SCALE AND MOISTURE WERE FOUND ON THE PLATE WHERE THE CORROSION FORMED. THE PLATE WAS REMOVED AND A NEW CARBON STEEL PLATE WAS WELDED IN. NO OTHER REHEATER DUCTS HAVE EXPERIENCED ANY SCALE OR MOISTURE ACCUMULATION.

```
4/80  SYSTEM                                                                720
```

** PROBLEMS/SOLUTIONS/COMMENTS

A PUMP LINER FAILURE OCCURRED IN APRIL. THE IMPELLER SHAFT LINER WAS REPAIRED AND REPLACED.

```
5/80  SYSTEM                                                                744
```

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS SHUT DOWN A FEW DAYS IN LATE APRIL AND 12 TO 14 DAYS IN EARLY MAY FOR AIR PREHEATER REPAIRS.

DURING APRIL AND MAY THE SCRUBBING SYSTEM EXPERIENCED AGITATOR PROBLEMS. THE RECENT PROBLEMS HAVE BEEN RELATED TO BEARING FAILURE, HOWEVER, THE SEALS HAVE BEEN LEAKING AS WELL. THE AGITATORS AT THIS FACILITY ARE SIDE MOUNTED. THE AGITATOR SHAFT ENTERS THE TANK AT ROUGHLY 12 FT BELOW THE FLUID SURFACE. IT APPEARS THAT THE SEAL LEAKING MAY BE ATTRIBUTABLE TO FAULTY INSTALLATION.

```
6/80  SYSTEM      92.1                                                      720   696          79.3
```

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE THE SCRUBBER EXHIBITED AN AVAILABILITY OF 92.1%. THERE WAS GREATER SCRUBBER CAPACITY AVAILABLE THAN REQUIRED BY THE BOILER. NO PROBLEMS WERE REPORTED FOR JUNE.

DAMPER PROBLEMS REPORTED PREVIOUSLY HAVE BEEN ELIMINATED. THE OLD OPERATOR MECHANISMS WERE REPLACED WITH OPERATORS SUPPLIED BY ANOTHER MANUFACTURER.

ONE OF THE MARBLE BEDS IS STILL PARTIALLY PLUGGED. THE MATERIAL SEEMS TO BE HARD CALCIUM SULFATE SCALE. THE SCALE WILL PROBABLY NOT CLEAR FURTHER THROUGH DISSOLUTION DURING NORMAL SCRUBBER OPERATIONS AS HAD BEEN HOPED. ALTHOUGH THE MODULE MUST OPERATE AT LOWER THAN DESIGN GAS FLOW SCRUBBER OPERATIONS ARE NOT HAMPERED OVERALL BECAUSE THE SYSTEM HAS SOME DESIGN SPARE CAPACITY.

THE REHEATER PROBLEM REPORTED PREVIOUSLY HAS OCCURRED ON THREE REHEATERS NOW. THE FAILURE OF THE REHEATER DUCT BOTTOM PANELS MAY BE A RESULT OF AN UNDERSIZED DEFLECTION SHIELD BENEATH THE TUBE BANKS. IT IS ALSO POSSIBLE THAT THE DUCTING WAS IMPROPERLY WELDED.

SECTION 15
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL FOREIGN FGD SYSTEMS

COMPANY NAME	CHUGOKU ELECTRIC	
PLANT NAME	SHIMONOSEKI	
UNIT NUMBER	1	
CITY	SHIMONOSEKI	
STATE		
GROSS UNIT GENERATING CAPACITY - MW	175.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	175.0	
EQUIVALENT SCRUBBED CAPACITY - MW	175.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	25046.	(10768 BTU/LB)
AVERAGE ASH CONTENT - %	24.60	
AVERAGE MOISTURE CONTENT - %	2.30	
AVERAGE SULFUR CONTENT - %	.59	
AVERAGE CHLORIDE CONTENT - %	.04	
** FGD SYSTEM		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	MITSUBISHI HEAVY INDUSTRIES	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	5/79	
COMMERCIAL START-UP DATE	7/79	
SO2 DESIGN REMOVAL EFFICIENCY - %	85.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	********	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	6.8	(108 GPM)
** BYPRODUCT		
BYPRODUCT NATURE	GYPSUM	
DISPOSITION		

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	100.0	100.0	100.0	100.0			744	744	744	
2/80	SYSTEM	55.2	100.0	55.2	55.2			696	384	384	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY AND THE FIRST HALF OF FEBRUARY THE FGD UNIT OPERATED WITH NO PROBLEMS. THE UNIT WAS TAKEN OFF-LINE IN THE MIDDLE OF FEBRUARY FOR SCHEDULED MAINTENANCE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	SYSTEM	100.0	.0		.0			744	0	0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER REMAINED DOWN THROUGH MARCH FOR THE ANNUAL MAINTENANCE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0	100.0		83.1			720	598	598	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE ANNUAL MAINTENANCE THE SCR (SELECTIVE CATALYTIC REDUCTION OF NOX) UNIT WAS CONNECTED BETWEEN THE BOILER AND AIR PREHEATER. AFTER THE STARTUP ON APRIL 6, COAL ONLY HAS BEEN USED (BEFORE FEBRUARY, COAL AND OIL WERE USED 50:50). EXCEPT FOR A 2 HOUR SHUTDOWN FOR A TURBINE TEST ON APRIL 7, THE FGD SYSTEM HAS OPERATED CONTINUOUSLY WITH NO PROBLEMS.

CHUGOKU ELECTRIC: SHIMONOSEKI 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	100.0	100.0		90.3			744	672	672	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM OPERATED CONTINOUSLY WITH NO PROBLEMS. A THREE DAY SHUTDOWN FOR INSPECTION OF THE SCR UNIT FROM MAY 16 TO MAY 19 WAS THE ONLY DOWN TIME EXPERIENCED DURING MAY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	SYSTEM	100.0	100.0		100.0			720	720	720	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM OPERATED CONTINOUSLY WITH NO PROBLEMS DURING JUNE.

SECTION 15
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL FOREIGN FGD SYSTEMS

COMPANY NAME	ELECTRIC POWER DEVELOPMENT CO.	
PLANT NAME	ISOGO	
UNIT NUMBER	1	
CITY	YOKOHAMA	
STATE	JAPAN	
GROSS UNIT GENERATING CAPACITY - MW	265.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	238.0	
EQUIVALENT SCRUBBED CAPACITY - MW	265.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	25958.	(11160 BTU/LB)
AVERAGE ASH CONTENT - %	16.00	
AVERAGE MOISTURE CONTENT - %	7.00	
AVERAGE SULFUR CONTENT - %	.60	
AVERAGE CHLORIDE CONTENT - %	********	
** FGD SYSTEM		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	IHI - CHEMICO	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	12/75	
COMMERCIAL START-UP DATE	3/76	
SO2 DESIGN REMOVAL EFFICIENCY - %	90.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	96.70	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	22.3	(354 GPM)
** BYPRODUCT		
BYPRODUCT NATURE	GYPSUM	
DISPOSITION	MARKETED	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/79	SYSTEM							720			
5/79	SYSTEM							744			
6/79	SYSTEM							720			
7/79	SYSTEM							744			
8/79	SYSTEM							744			
9/79	SYSTEM							720			
10/79	SYSTEM							744			
11/79	SYSTEM							720			
12/79	SYSTEM							744			
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

ELECTRIC POWER DEVELOPMENT CO.: ISOGO 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THE APRIL 1979 THROUGH MARCH 1980 PERIOD.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM OPERATED ALONG WITH THE BOILER FOR THE ENTIRE MONTH OF APRIL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	100.0	100.0	100.0	51.6			744	384	384	
6/80	SYSTEM	100.0	100.0	100.0	13.3			720	96	96	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS SHUT DOWN FROM MAY 17 TO JUNE 27 FOR ANNUAL MAINTENANCE. THE FGD SYSTEM WAS OPERATED DURING ALL OF THE BOILER OPERATION IN MAY AND JUNE.

SECTION 15
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL FOREIGN FGD SYSTEMS

COMPANY NAME	ELECTRIC POWER DEVELOPMENT CO.	
PLANT NAME	ISOGO	
UNIT NUMBER	2	
CITY	YOKOHAMA	
STATE	JAPAN	
GROSS UNIT GENERATING CAPACITY - MW	265.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	238.0	
EQUIVALENT SCRUBBED CAPACITY - MW	265.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	25958.	(11160 BTU/LB)
AVERAGE ASH CONTENT - %	16.00	
AVERAGE MOISTURE CONTENT - %	7.00	
AVERAGE SULFUR CONTENT - %	.60	
AVERAGE CHLORIDE CONTENT - %	********	
** FGD SYSTEM		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	IHI - CHEMICO	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	3.0	
INITIAL START-UP DATE	3/76	
COMMERCIAL START-UP DATE	5/76	
SO2 DESIGN REMOVAL EFFICIENCY - %	90.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	96.70	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	22.3	(354 GPM)
** BYPRODUCT		
BYPRODUCT NATURE	GYPSUM	
DISPOSITION	MARKETED	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/79	SYSTEM							720			
5/79	SYSTEM							744			
6/79	SYSTEM							720			
7/79	SYSTEM							744			
8/79	SYSTEM							744			
9/79	SYSTEM							720			
10/79	SYSTEM							744			
11/79	SYSTEM							720			
12/79	SYSTEM							744			
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

ELECTRIC POWER DEVELOPMENT CO.: ISOGO 2 (CONT.)

```
------------------------------------------PERFORMANCE DATA----------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             NO INFORMATION WAS AVAILABLE FOR THE APRIL 1979 THROUGH MARCH 1980 PERIOD.

 4/80  SYSTEM      100.0        100.0       100.0       33.3                    720   240    240

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             ON MARCH 30 THE BOILER WAS SHUTDOWN FOR ANNUAL MAINTENANCE.  THE UNIT
                             REMAINED DOWN THROUGH APRIL 20.  WHEN OPERATIONS COMMENCED THE FGD SYSTEM
                             OPERATED WITH THE BOILER FOR THE REST OF THE MONTH.

 5/80  SYSTEM      100.0        100.0       100.0       100.0                   744   744    744

 6/80  SYSTEM      100.0        100.0       100.0       100.0                   720   720    720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             DURING MAY AND JUNE THE FGD OPERATED WITH NO PROBLEMS.
```

SECTION 15
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL FOREIGN FGD SYSTEMS

COMPANY NAME	ELECTRIC POWER DEVELOPMENT CO.	
PLANT NAME	TAKASAGO	
UNIT NUMBER	1	
CITY	TAKASAGO	
STATE	JAPAN	
GROSS UNIT GENERATING CAPACITY - MW	250.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	230.0	
EQUIVALENT SCRUBBED CAPACITY - MW	250.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	25958.	(11160 BTU/LB)
AVERAGE ASH CONTENT - %	22.00	
AVERAGE MOISTURE CONTENT - %	7.00	
AVERAGE SULFUR CONTENT - %	1.80	
AVERAGE CHLORIDE CONTENT - %	********	
** FGD SYSTEM		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	MITSUI - CHEMICO	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	3.2	
INITIAL START-UP DATE	2/75	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	93.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	********	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	13.1	(208 GPM)
** BYPRODUCT		
BYPRODUCT NATURE	GYPSUM	
DISPOSITION		

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/79	SYSTEM							720			
6/79	SYSTEM							720			
7/79	SYSTEM							744			
8/79	SYSTEM							744			
9/79	SYSTEM							720			
10/79	SYSTEM							744			
11/79	SYSTEM							720			
12/79	SYSTEM							744			
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

ELECTRIC POWER DEVELOPMENT CO.: TAKASAGO 1 (CONT.)

```
-----------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                     NO INFORMATION WAS AVAILABLE FOR THE APRIL 1979 THROUGH MARCH 1980 PERIOD.

 4/80  SYSTEM     100.0        100.0       100.0        30.0                   720   216    216

       ** PROBLEMS/SOLUTIONS/COMMENTS

                     THE BOILER WAS SHUTDOWN ON MARCH 29 FOR ANNUAL MAINTENANCE.  THE UNIT
                     REMAINED OFF LINE THROUGH APRIL 21.  WHEN OPERATIONS COMMENCED THE FGD
                     SYSTEM OPERATED WITH THE BOILER FOR THE REST OF THE MONTH.

 5/80  SYSTEM     100.0        100.0       100.0       100.0                   744   744    744

 6/80  SYSTEM     100.0        100.0       100.0       100.0                   720   720    720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                     THE FGD SYSTEM EXPERIENCED NO PROBLEMS DURING THE MAY-JUNE PERIOD.
```

SECTION 15
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL FOREIGN FGD SYSTEMS

```
COMPANY NAME                                    ELECTRIC POWER DEVELOPMENT CO.
PLANT NAME                                      TAKASAGO
UNIT NUMBER                                     2
CITY                                            TAKASAGO
STATE                                           JAPAN
GROSS UNIT GENERATING CAPACITY - MW               250.0
NET UNIT GENERATING CAPACITY W/FGD - MW           230.0
EQUIVALENT SCRUBBED CAPACITY - MW                 250.0

** FUEL DATA
    FUEL TYPE                                   COAL
    FUEL GRADE                                  ******
    AVERAGE HEAT CONTENT - J/G                   25958.        ( 11160 BTU/LB)
    AVERAGE ASH CONTENT - %                         22.00
    AVERAGE MOISTURE CONTENT - %                     7.00
    AVERAGE SULFUR CONTENT - %                       1.80
    AVERAGE CHLORIDE CONTENT - %                ********

** FGD SYSTEM
    GENERAL PROCESS TYPE                        WET SCRUBBING
    PROCESS TYPE                                LIMESTONE
    SYSTEM SUPPLIER                             MITSUI - CHEMICO
    NEW/RETROFIT                                RETROFIT
    ENERGY CONSUMPTION - %                         3.2
    INITIAL START-UP DATE                        3/76
    COMMERCIAL START-UP DATE                    **/**
    SO2 DESIGN REMOVAL EFFICIENCY - %               93.00
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %   ********
    ABSORBER SPARE COMPONENTS INDEX                   .0

** WATER LOOP
    TYPE                                        OPEN
    FRESH MAKE-UP WATER - LITER/S                  13.1        (  208 GPM)

** BYPRODUCT
    BYPRODUCT NATURE                            GYPSUM
    DISPOSITION

------------------------------------------PERFORMANCE DATA--------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 4/79  SYSTEM                                                               720

 5/79  SYSTEM                                                               744

 6/79  SYSTEM                                                               720

 7/79  SYSTEM                                                               744

 8/79  SYSTEM                                                               744

 9/79  SYSTEM                                                               720

10/79  SYSTEM                                                               744

11/79  SYSTEM                                                               720

12/79  SYSTEM                                                               744

 1/80  SYSTEM                                                               744

 2/80  SYSTEM                                                               696

 3/80  SYSTEM                                                               744
```

ELECTRIC POWER DEVELOPMENT CO.: TAKASAGO 2 (CONT.)

```
------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           NO INFORMATION WAS AVAILABLE FOR THE APRIL 1979 THROUGH MARCH 1980 PERIOD.

 4/80  SYSTEM    100.0        100.0       100.0       100.0                  720   720    720

 5/80  SYSTEM    100.0        100.0       100.0       100.0                  744   744    744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           DURING APRIL AND MAY THE UTILITY EXPERIENCED NO PROBLEMS WITH THE FGD
                           SYSTEM.

 6/80  SYSTEM    100.0        100.0       100.0         4.4                  720    32     32

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE BOILER WAS SHUTDOWN FROM JUNE 3 TO JUNE 24 FOR ANNUAL MAINTENANCE.
                           THE FGD SYSTEM OPERATED ALONG WITH THE BOILER THE REMAINDER OF THE TIME.
```

SECTION 15
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL FOREIGN FGD SYSTEMS

COMPANY NAME	ELECTRIC POWER DEVELOPMENT CO.	
PLANT NAME	TAKEHARA	
UNIT NUMBER	1	
CITY	MIHARA	
STATE	JAPAN	
GROSS UNIT GENERATING CAPACITY - MW	250.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	231.0	
EQUIVALENT SCRUBBED CAPACITY - MW	250.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	25130.	(10804 BTU/LB)
AVERAGE ASH CONTENT - %	23.00	
AVERAGE MOISTURE CONTENT - %	9.05	
AVERAGE SULFUR CONTENT - %	2.00	
AVERAGE CHLORIDE CONTENT - %	.05	
** FGD SYSTEM		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	BABCOCK - HITACHI	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	3.2	
INITIAL START-UP DATE	2/77	
COMMERCIAL START-UP DATE	2/79	
SO2 DESIGN REMOVAL EFFICIENCY - %	94.20	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	91.70	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	14.9	(237 GPM)
** BYPRODUCT		
BYPRODUCT NATURE	GYPSUM	
DISPOSITION	MARKETED	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/79	SYSTEM							720			
5/79	SYSTEM							744			
6/79	SYSTEM							720			
7/79	SYSTEM							744			
8/79	SYSTEM							744			
9/79	SYSTEM							720			
10/79	SYSTEM							744			
11/79	SYSTEM							720			
12/79	SYSTEM							744			
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

ELECTRIC POWER DEVELOPMENT CO.: TAKEHARA 1 (CONT.)

PERFORMANCE DATA

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THE APRIL 1979 THROUGH MARCH 1980 PERIOD.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	
5/80	SYSTEM	100.0	100.0	100.0	100.0			744	744	744	
6/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE APRIL, MAY AND JUNE PERIOD THE EGD SYSTEM OPERATED CONTINUOUSLY WITHOUT APPRECIABLE TROUBLE.

APPENDIX A

FGD SYSTEM COST DATA: OPERATIONAL AND NONOPERATIONAL SYSTEMS

INTRODUCTION

The cost of flue gas desulfurization (FGD) systems for the control of sulfur dioxide emissions is an area of intense interest and substantial controversy. As a result, many computer models have recently been developed to estimate capital and annual costs. As part of an effort by the U.S. Environmental Protection Agency to provide meaningful economic data concerning FGD systems, reported economic data have been incorporated into the EPA Utility FGD Survey report. This information has appeared as a separate appendix of the report since October 1976. Until January 1978, this cost appendix consisted entirely of data reported by the utilities with little or no interpretation provided by PEDCo Environmental, Inc. Beginning with the May 1978 report, the format and content of the cost appendix were revised to include reported and adjusted costs for the operational FGD systems.

The rationale for including adjusted as well as reported costs stems primarily from the lack of comparability of the reported costs. Many of the reported cost figures, both capital and operating, are largely site-sensitive values that cannot be accurately compared because they refer to different FGD battery limits and different years in which the expenditures were made. As a result, an analysis of the cost data was made for the operational units since these systems offer the potential of having complete and accurate economic data. The adjustments were made to provide comparable, accurate cost data for the sulfur dioxide portion of the emission control system. This, in effect, will eliminate much of the confusion that exists concerning the reported data, and it will provide a common basis for the reported costs.

In an attempt to promote further comparability of the figures, the adjustment procedure was carried one step further and standardized adjusted figures were developed. This was done by modifying the fixed annual cost rates such that they would be identical for each unit (i.e. cost of depreciation, interim replacement, taxes, insurance and capital costs). The newly adjusted total fixed annual cost rate was applied to the total adjusted capital cost in each case and a standardized adjusted annual cost was obtained.

APPROACH

In March 1978, each utility having at least one operational FGD system was given a cost form containing all available cost information then in the PEDCo files. The utility was asked to verify the data and fill in any missing information called for on the form. A follow-up visit by the PEDCo Environmental staff was arranged to assist in data acquisition and to insure completeness and reliability of information. Results of the cost analysis were forwarded to each participating utility for final review and comment.

The cost data were treated solely to establish the accurate costs for FGD systems, on a common basis, not to critique the design or reasonableness of the costs reported by any utility. Adjustments focused primarily on the following items:

- All capital costs were adjusted to July 1, 1977, dollars using the Chemical Engineering Index. All capital costs, represented in dollars/kilowatt ($/kW), were expressed in terms of gross megawatts (MW). Actual costs were reported by utilities in dollar values for years 1970 to 1980. These values are represented in terms of the year of greatest capital expenditures.

- Gross unit capacity was used to express all FGD capital expenditures because the capital requirement of an FGD system is dependent on actual boiler size before derating for auxiliary and air quality control power requirements.

- Particulate control costs were deducted. Since the purpose of the study was to estimate the incremental cost for sulfur dioxide control, particulate control costs were deducted using either data contained in the cost breakdowns or as a percentage of the total direct cost (capital and annual). The percentage reduction varied depending upon system design and operation.

- The capital costs associated with the modification or installation of equipment not part of the FGD system but needed for its proper functioning, were included (e.g. - stack lining, modification to existing ductwork or fans, etc.).

- Indirect charges were adjusted to provide adequate funds for engineering, field expenses, legal expenses, insurance, interest during construction, allowance for startup, taxes, and contingency.

- All annual costs, represented in mills/kilowatt-hour (mills/kWh), were expressed in terms of net megawatts (MW).

- Net unit capacity was used to express all FGD annual expenditures because the annual cost requirement of an FGD system is dependent on the actual amount of kilowatt-hours (kWh) produced by the unit after derating for auxiliary and air quality control power requirements.

- All annual costs were adjusted to a common capacity factor (65%).

- Replacement power costs were not included since only a few utilities reported such costs and these were presented using a variety of methods.

- Sludge disposal costs were adjusted to reflect the costs of sulfur dioxide waste disposal only (i.e., excluding fly ash disposal) and to provide for disposal over the anticipated lifetime of the FGD system. This latter correction was necessary since several utilities reported costs for sludge disposal capacity that would last only a fraction of the FGD system life. The adjustments were based on a land cost of $2000/acre with a sludge depth of 50 ft in a clay-lined pond (clay is assumed to be available at the site).

- A 30-year life was assumed for all process and economic considerations for all new systems that were installed for the life of the unit. A 20-year life was assumed for all process and economic considerations for retrofit systems that were installed for the remaining portion of the life of the unit.*

- Regeneration and by-product recovery facility costs were added for those regenerable systems not reporting such costs.

To the extent possible, all cost adjustments were made using the previous assumptions developed by PEDCo Environmental. When cost data were inadequate, adjustments were made using process design data in conjunction with the previous cost assumptions. In some cases, no adjustments were possible because of insufficient data.

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* The use of a 30-year service life for new units coincides with the conclusion of the National Power Survey of the Federal Power Commission which recognized this value as reasonable for steam-electric plants. A 20-year service life was assumed for all retrofit units even if the remaining life of the units is less than this value. Thus, two different rates are used and should be noted when making comparisons between new and retrofit systems.

DESCRIPTION OF COST ELEMENTS

Capital costs consist of direct costs, indirect costs, contingency costs, and other capital costs. Direct costs include the "bought-out" cost of the equipment, the cost of installation, and site development. Indirect costs include interest during construction, contractor's fees and expenses, engineering, legal expenses, taxes, insurance, allowance for start-up and shakedown, and spares. Contingency costs include those costs resulting from malfunctions, equipment alterations, and similar unforeseen sources. Other capital costs include the nondepreciable items of land and working capital.

Annual costs consist of direct costs, fixed costs, and overhead costs. Direct costs include the cost of raw materials, utilities, operating labor and supervision, and maintenance and repairs. Fixed costs include those of depreciation, interim replacement, insurance, taxes, and interest on borrowed capital. Overhead costs include those of plant and payroll expenses. The various capital and annual cost components are discussed and defined in greater detail in the following paragraphs.

The direct capital costs include the following elements:

- Equipment required for the FGD system. Table A-1 provides a summary of the major process equipment used in regenerable and nonregenerable systems.
- Installation of equipment, including foundations; steel work for support, buildings, piping and ducting for effluents, slurries, sludge, and make-up water, control panels, instrumentation, insulation of ducting, buildings, piping, and other equipment, painting and piling.
- Site development may include clearing and grading, construction of access roads and walkways, establishment of rail, barge, and/or truck facilities, and parking facilities.

TABLE A-1. MAJOR FGD SYSTEM EQUIPMENT SUMMARY

Category	Description
Material handling-raw materials	Equipment for the handling and transfer of raw materials includes unloading facilities, conveyors, storage areas and silos, vibrators, atmospheric emission control associated with these facilities, and related accessories.
Feed preparation-raw materials	Equipment for the preparation of raw material to produce a feed slurry consists of feed weighers, crushers, grinders, classifiers, ball mills, mixing tanks, pumps, agitators, and related accessories.
Sulfur dioxide absorption	Equipment for treating the flue gas includes absorbers, mist eliminators, hold tanks, agitators, circulating pumps, pond water return pumps, and related accessories.
Flue gas reheat	Equipment required includes air, steam, or hot water heaters, condensate tanks, pumps, soot blowers, fans, fuel storage facilities, gas bypass equipment, and related accessories.
Gas handling	Equipment to handle the boiler flue gas includes booster fans, ductwork, flue gas bypass system, turning vanes, supports, platforms, and related accessories.
Sludge disposal	Nonregenerable FGD systems require solids/water separation equipment such as clarifiers, vacuum filters, centrifuges, sludge fixation equipment, and related accessories.
Utilities	Equipment to supply power and water to the FGD equipment consists of switch-gear, breakers, transformers, piping, and related accessories.
By-product handling	Equipment for processing the by-product of regenerable FGD systems may include a rotary kiln, fluid bed dryer, conveyor, storage silo, vibrator, combustion equipment and oil storage tanks, waste heat boilers, hammer mills, evaporators, crystallizers, strippers, tanks, agitators, pumps, compressors, sulfuric acid absorber and cooling, mist eliminator, pumps, acid coolers, tanks, etc.

(continued)

TABLE A-1. (continued)

Category	Description
Regeneration	Equipment for regeneration of the absorbing medium of an FGD system may consist of reactor vessels, material handling system, storage, weigh feeder, conveyor, rotary kiln, fluid bed calciner, dust collector, storage silo, vibrator, combustion equipment and oil storage tanks, waste heat boiler, hammer mill, evaporators, crystallizers, strippers, tanks, agitators, pumps, compressors, sulfuric acid absorber and cooling, mist eliminator, pumps, acid coolers, tanks, etc.
Purge treatment	Equipment for the removal of purge material (e.g. sodium sulfate) includes refrigeration, pumps, tanks, crystallizer, centrifuge, dryer, dust collector, conveyors, storage, and related equipment.
Auxiliary	Equipment not directly related to the FGD system, but which may require design or modification to accommodate an FGD system may include such items as existing fans, ducts, or stack. If new fans, ducts, or stacks are added to improve boiler performance and accommodate the FGD system, the costs are prorated to the boiler and FGD system.

Indirect capital costs include the following elements:

- Interest accrued on borrowed capital during construction.
- Contractor's fee and expenses, including costs for field labor payroll; field office supervision; personnel; construction offices; temporary roadways; railroad trackage; maintenance and welding shops; parking lot; communications; temporary piping and electrical and sanitary facilities; safety security (fire, material, medical, etc.); construction tools and rental equipment; unloading and storage of materials; travel expenses; permits; licenses; taxes; insurance; overhead; legal liabilities; field testing of equipment; start-up; and labor relations.
- Engineering costs, including administrative, process, project, and general; design and related functions for specifications; bid analysis; special studies; cost analysis; accounting; reports; consultant fees; purchasing; procurement; travel expenses; living expenses; expediting; inspection; safety; communications; modeling; pilot plant studies (if required because of process design or application novelty); royalty payments during construction; training of plant personnel; field engineering; safety engineering; and consultant services.
- Legal expenses, including those for securing permits, rights-of-way, etc.
- Taxes, including sales, and excise taxes.
- Insurance covering liability for equipment in transit and at site; fire, casualty, injury, and death; damage to property; delay; and noncompliance.
- Allowance for start-up and shakedown includes the cost associated with system start-up.
- Spare parts including pumps, valves, controls, special piping and fittings, instruments, spray nozzles, and similar items.

Other capital costs include the following elements:

- Land required for the FGD process, waste disposal, regeneration facility, and storage.
- Working capital, including the total amount of money invested in raw materials and supplies in stock, finished products in stock, and unfinished products

in the process of being manufactured; accounts receivable; cash kept on hand for payment of operating expenses such as salaries, wages, and raw materials purchases; accounts payable; and taxes payable.

Annual cost of an FGD system includes the following direct, fixed and overhead charges:

- Direct Charges

    - Raw materials, including those required by the FGD process for sulfur dioxide control, absorbent regeneration, sludge treatment, sludge fixation, flocculants, etc.

    - Utilities, including water for slurries, cooling and cleaning; electricity for pumps, fans, valves, lighting controls, conveyors, and mixers; fuel for reheating of flue gases; and stream for processing.

    - Operating labor, including supervisory, skilled, and unskilled labor required to operate, monitor, and control the FGD process.

    - Maintenance and repairs, consisting of both manpower and materials to keep the unit operating efficiently. The function of maintenance is both preventive and corrective to keep outages to a minimum.

    - Byproduct Sales: credit from the sale of byproducts regenerable FGD processes (e.g. sulfur, sulfuric acid) is a negative charge deducted from the annual direct cost to obtain the net annual direct cost of the FGD system.

- Fixed Charges

    - Depreciation - the annual charge to recover direct and indirect costs of physical assets over the life of the asset.

    - Interim, replacement - costs expended for temporary or provisional replacement of equipment that has failed or malfunctioned prematurely.

    - Insurance, including the costs of protection from loss by a specified contingency, peril, or unforeseen event. Required coverage could include losses due to fire, personal injury or death, property damage, explosion, lightning, or other natural phenomena.

- Taxes, including franchise, excise, and property taxes levied by a city, county, state, or Federal government.

- Interest on borrowed funds.

° Overhead

Plant and administrative overhead is a business expense that is not charged directly to a particular part of a project, but is allocated to it. Overhead costs include administrative, safety, engineering, legal and medical services; payroll; employee benefits; recreation; and public relations.

Table A-2 provides a summary of the means used to determine the missing cost elements if the costs were not reported or insufficient information prevented their actual determination. The assumptions and cost bases for determining the capital and annual costs of FGD systems were developed by the PEDCo staff based upon previous economic studies conducted for the U.S. EPA (Flue Gas Desulfurization Process Cost Assessment, May 1975; Simplified Procedures for Estimating Flue Gas Desulfurization System Costs, June 1976, EPA-600/2-76-150; Particulate and Sulfur Dioxide Emission Control Costs for Large Coal-Fired Boilers, March 1978, EPA-600/7-78-032).

TABLE A-2. COST ELEMENT FACTORS

Category	Value
Indirect capital costs:	
Interest during construction	10% of total direct capital costs
Field overhead	10% of total direct capital costs
Contractor's fee and expenses	5% of total direct capital costs
Engineering	10% of total direct capital costs
Taxes	2% of total direct capital costs
Spares	1% of total direct capital costs
Shakedown allowance	5% of total direct capital costs
Other capital costs:	
Contingency[a]	20% of total direct and indirect capital costs
Direct annual costs:	
Raw materials:	
Fixation chemicals	\$2/ton
Lime	\$40/ton
Limestone	\$10/ton
Magnesium oxide	\$150/ton
Sodium carbonate	\$80/ton
Salt cake (credit)	\$50/ton
Sulfur (credit)	\$65/ton
Sulfuric acid (credit)	\$25/ton
Utilities:	
Electricity	25 mills/kWh
Water	\$0.20/10^3 gal
Steam	\$0.80/10^6 Btu
Operating labor:	
Direct labor	\$8.50/man-hour
Supervision	15% of direct labor costs

[a] Contingency costs are used only when the cost data supplied are incomplete (such as equipment costs or direct costs only) and a contingency cost must be factored in to give an accurate estimate of the total capital cost.

(continued)

TABLE A-2. (continued)

Category	Value
Maintenance:	
Labor and materials	4% of total direct capital costs
Supplies	15% of labor and materials costs
Overhead:	
Plant	50% of operation and maintenance costs
Payroll	20% of operating labor costs
Fixed annual costs:	
Depreciation	3.33% or 5% (new or retrofit)
Interim replacement[b]	0.7% or 0.35%
Taxes	4%
Insurance	0.3%
Capital costs	9%

[b] Some system components have life spans less than the expected service life of the system. Interim replacement is an allowance factor used in estimating annual revenue requirements to provide for the replacement of these short-lived items. An average allowance of 0.35% of the total investment is normally provided and used for systems with an expected service life of 20 years or less. A higher allowance of 0.70% of the total investment is provided and used for systems with an expected service life of 30 years or more.

DEFINITION OF COST ELEMENTS

The costs displayed in Appendix A are accompanied by a series of alphabetic characters summarizing data presented for each FGD system. These relate to the cost elements described earlier in this section and identify what has been included and excluded for reported and adjusted capital and annual costs. The alphabetic characters, along with their titles, are briefly described in Table A-3.

TABLE A-3. DESCRIPTION OF COST

Code	Title	Description
A	Particulate control (required for FGD process) included in capital cost.	Particulate precollection device (ESP, fabric filter, venturi) prior to FGD system required for proper operation of SO_2 control system.
B	Particulate control (included in FGD process) included in capital cost.	Particulate collection equipment (venturi scrubber) is included in the FGD system.
C	Total direct capital costs included.	Complete cost of all FGD equipment, the labor and materials required for equipment installation, and interconnecting the system is included in the total capital cost.
D	Partial direct capital costs included.	One or a number of direct cost items, or the cost associated with one or a number of direct cost items, are excluded from the total capital cost.
E	Total indirect capital costs included.	Complete cost of all the indirect cost elements, including interest during construction, contractor's fees, engineering, legal expenses, taxes, insurance, allowance for start-up, and spares, is included in total capital cost.
F	Partial indirect costs included.	One or a number of indirect cost items, or the cost associated with one or a number of indirect cost items, are excluded from the total capital cost.
G	Chemical fixation of sludge included in capital cost.	The cost of a chemical fixation process which stabilizes the flue gas cleaning wastes prior to disposal is included in the total capital cost.
H	Dry sludge disposal included in capital cost.	The cost of a secondary dewatering or treatment method, such as filtration, centrifugation, or forced oxidation, which ultimately produces a dry sludge cake for final disposal, is included in the total capital cost.
I	Off-site landfill area included in capital cost.	The cost of an off-site area used as a landfill for flue gas cleaning wastes is included in the total capital cost.
J	Sludge pond included in capital cost.	The cost of an on-site disposal area for ponding of treated or untreated flue gas cleaning wastes is included in the total capital cost.
K	Additional sludge disposal capacity added for life of system.	The cost of additional SO_2 waste disposal capacity required for FGD system operation over the anticipated service life of the unit is included in the total capital cost.
L	Stack included in capital cost.	The cost of the stack is included in the total capital cost.
M	Modifications to stack, ducts, and/or fans included in capital cost.	Modifications to existing equipment (stack, fans, ducts, etc.) which are required because of inclusion of an FGD system.
N	Total regeneration facility cost included in capital cost.	Complete cost of entire regeneration facility included in total capital cost.
O	Partial regeneration facility cost included in capital cost.	Part of the cost associated with the regeneration facility included in the total capital cost.
P	R & D costs included in capital cost.	Bench scale or pilot plant studies to determine process and design characteristics.

(continued)

TABLE A-3. (continued)

Code	Title	Description
Q	Costs underwritten by system supplier included in capital cost.	Capital expenditures underwritten by the system supplier for system repairs or modifications for optimization of performance or R & D programs.
R	Excess reagent supply costs included in capital cost.	Capital expenditures for reagent supply exceeds the amount required for the period of initial operation.
S	Total direct annual costs included.	Complete cost of all raw materials, utilities, operating labor and maintenance and repairs is included in the total annual cost.
T	Partial direct annual costs included.	One or a number of direct annual cost items, or the cost associated with one or a number of direct annual cost items, are excluded from the total annual cost.
U	Total fixed annual costs included.	Complete cost of all fixed cost elements, including depreciation, interim replacement, insurance, taxes, and interest, is included in the total annual cost.
V	Partial fixed annual costs included.	One or a number of fixed annual cost items, or the cost associated with one or a number of fixed annual cost items, are excluded from the total annual cost.
W	Overhead cost included in total annual cost.	Plant and payroll overhead costs are included in the total annual cost.
X	Particulate control costs included in direct annual cost.	The cost of operating particulate collection equipment included in the FGD system is included in the total annual cost.
Y	Sludge disposal service costs (contract) included in direct annual cost.	The treatment and disposal of flue gas cleaning wastes that are handled by an outside firm.
Z	Replacement energy costs included in total annual costs.	The cost of additional power-generating capacity required to compensate for power used by the FGD system.

RESULTS OF COST ANALYSIS

The results of the operational FGD system survey are summarized in Table A-4 and Section A-1. Table A-4 produces a summary of a categorical analysis of the reported and adjusted capital and annual costs for the operational FGD systems addressed in the survey. Included in this categorical analysis are the ranges, means, and standard deviation for all the various types and categories of FGD systems examined. Section A-1 summarizes the reported and adjusted capital and annual costs for all the operational FGD systems that were addressed in the cost study (Section A-2 summarizes available cost data for nonoperational FGD systems).

TABLE A-4. CATEGORICAL RESULTS OF THE REPORTED AND ADJUSTED CAPITAL AND ANNUAL COSTS FOR OPERATIONAL FGD SYSTEMS

CATEGORY	REPORTED						ADJUSTED					
	CAPITAL, $/KW			ANNUAL, MILLS/KWH			CAPITAL, $/KW			ANNUAL, MILLS/KWH		
	RANGE	AVG	DEV	RANGE	AVG	DEV	RANGE	AVG	DEV	RANGE	AVG	DEV
ALL	29.2-189.0	80.3	39.2	.1- 14.9	4.5	4.4	56.0-140.6	88.0	23.4	2.6- 12.4	5.4	2.4
NEW	31.8-189.0	80.4	39.6	.1- 14.3	3.3	3.9	66.4-117.6	86.1	17.8	2.8- 8.7	5.2	2.0
RETROFIT	29.2-156.9	80.1	38.5	2.1- 14.9	6.5	4.5	56.0-140.6	90.0	28.1	2.6- 12.4	5.6	2.7
THROWAWAY PRODUCT	29.2-189.0	76.7	37.5	.1- 14.3	4.2	4.1	56.0-140.6	86.2	21.9	2.6- 8.7	5.1	2.0
SALEABLE PRODUCT	127.9-156.9	137.6	13.7	14.9- 14.9	14.9	.0	134.8-134.8	134.8	.0	12.4- 12.4	12.4	.0
LIMESTONE	31.8-168.0	76.9	38.7	1.3- 3.3	2.1	.6	56.0-117.6	88.6	25.5	2.6- 6.6	4.6	1.6
LIME	29.2-128.3	74.9	32.2	.1- 14.3	6.9	4.8	67.5-140.6	90.8	22.2	2.7- 8.7	6.4	2.0
DUAL ALKALI	43.2-189.0	96.7	65.5	3.2- 3.2	3.2	.0	*****- .0	.0	.0	*****- .0	.0	.0
LIME/ALKALINE FLYASH	77.1- 85.9	80.0	4.1	.3- .3	.3	.0	77.2- 93.0	82.5	7.4	4.1- 5.2	4.5	.5
SODIUM CARBONATE	42.9-120.0	79.8	37.0	2.1- 2.1	2.1	.0	60.9-107.9	76.6	22.2	3.2- 4.4	3.6	.6
WELLMAN LORD	127.9-156.9	137.6	13.7	14.9- 14.9	14.9	.0	134.8-134.8	134.8	.0	12.4- 12.4	12.4	.0
LIMESTONE/ALKALINE FLYASH	47.9- 47.9	47.9	.0	2.0- 2.0	2.0	.0	71.2- 71.2	71.2	.0	2.8- 2.8	2.8	.0

SECTION A-1
COSTS FOR OPERATIONAL FGD SYSTEMS

UNIT DESCRIPTION	COST DESCRIPTION	COST REPORTED	COST ADJUSTED	COST STANDARDIZED ADJUSTED
ALABAMA ELECTRIC COOP	CAPACITY FACTOR, %	***	65	65
TOMBIGBEE	TOTAL CAPITAL, $/KW(YEAR)	69.5(1978)	******(0)	******(0)
3	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
179.0 MW (NET)	COST ELEMENTS	C,E,J		
ARIZONA ELECTRIC POWER COOP	CAPACITY FACTOR, %	44	65	65
APACHE	TOTAL CAPITAL, $/KW(YEAR)	35.9(1977)	******(0)	******(0)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.1(1978)	******(0)	******(0)
97.5 MW (NET)	COST ELEMENTS	C,E,H,J,L,S, U,W,Y,Z		
ARIZONA ELECTRIC POWER COOP	CAPACITY FACTOR, %	44	65	65
APACHE	TOTAL CAPITAL, $/KW(YEAR)	31.8(1977)	******(0)	******(0)
3	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.1(1978)	******(0)	******(0)
97.5 MW (NET)	COST ELEMENTS	C,E,H,J,L,S, U,W,Y,Z		
ARIZONA PUBLIC SERVICE	CAPACITY FACTOR, %	85	65	65
CHOLLA	TOTAL CAPITAL, $/KW(YEAR)	52.0(1973)	56.0(1977)	56.0(1977)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.2(1976)	2.6(1977)	2.3(1977)
119.0 MW (NET)	COST ELEMENTS	B,C,E,S,U,X	C,E,K,S,U,W	C,E,K,S,U,W
ARIZONA PUBLIC SERVICE	CAPACITY FACTOR, %	65	65	65
CHOLLA	TOTAL CAPITAL, $/KW(YEAR)	168.0(1978)	******(0)	******(0)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	1.5(1978)	******(0)	******(0)
264.0 MW (NET)	COST ELEMENTS	B,D,T,X		
BIG RIVERS ELECTRIC	CAPACITY FACTOR, %	***	65	65
GREEN	TOTAL CAPITAL, $/KW(YEAR)	43.0(1976)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
242.0 MW (NET)	COST ELEMENTS	B,C		
CENTRAL ILLINOIS LIGHT	CAPACITY FACTOR, %	***	65	65
DUCK CREEK	TOTAL CAPITAL, $/KW(YEAR)	93.3(1978)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	3.3(1976)	******(0)	******(0)
416.0 MW (NET)	COST ELEMENTS	C,E,J,M		
CENTRAL ILLINOIS PUBLIC SERV	CAPACITY FACTOR, %	***	65	65
NEWTON	TOTAL CAPITAL, $/KH(YEAR)	189.0(1979)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
517.0 MW (NET)	COST ELEMENTS	C,E,G		
COLORADO UTE ELECTRIC ASSN.	CAPACITY FACTOR, %	***	65	65
CRAIG	TOTAL CAPITAL, $/KW(YEAR)	73.7(1979)	******(0)	******(0)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
447.0 MW (NET)	COST ELEMENTS	A,C		
COLUMBUS & SOUTHERN OHIO ELEC.	CAPACITY FACTOR, %	48	65	65
CONESVILLE	TOTAL CAPITAL, $/KW(YEAR)	55.5(1975)	70.7(1977)	70.7(1977)
5	TOTAL ANNUAL, MILLS/KWH(YEAR)	5.8(1978)	7.4(1977)	7.4(1977)
411.0 MW (NET)	COST ELEMENTS	B,C,J,M,S,U, W,X,Y	C,E,J,M,S,U, W,Y	C,E,J,M,S,U, W,Y

****** INDICATES COST FIGURES NOT YET AVAILABLE

SECTION A-1
COSTS FOR OPERATIONAL FGD SYSTEMS

		COST		
UNIT DESCRIPTION	COST DESCRIPTION	REPORTED	ADJUSTED	STANDARDIZED ADJUSTED
COLUMBUS & SOUTHERN OHIO ELEC.	CAPACITY FACTOR, %	48	65	65
CONESVILLE	TOTAL CAPITAL, $/KW(YEAR)	55.5(1978)	70.7(1977)	******(0)
5	TOTAL ANNUAL, MILLS/KWH(YEAR)	5.8(1978)	******(0)	******(0)
411.0 MW (NET)	COST ELEMENTS	B,C,J,M,S,U, W,X,Y	C,E,J,M,S,U, W,Y	
COMMONWEALTH EDISON	CAPACITY FACTOR, %	***	65	65
POWERTON	TOTAL CAPITAL, $/KW(YEAR)	125.0(1979)	******(0)	******(0)
51	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
450.0 MW (NET)	COST ELEMENTS	C,E,H,J		
DUQUESNE LIGHT	CAPACITY FACTOR, %	64	65	65
ELRAMA	TOTAL CAPITAL, $/KW(YEAR)	113.4(1976)	127.1(1977)	127.1(1977)
1-4	TOTAL ANNUAL, MILLS/KWH(YEAR)	8.6(1977)	7.8(1977)	7.5(1977)
510.0 MW (NET)	COST ELEMENTS	B,D,F,I,J,M, T,V,X,Y	C,E,I,J,M,S, U,Y	C,E,I,J,M,S, U,Y
DUQUESNE LIGHT	CAPACITY FACTOR, %	70	65	65
PHILLIPS	TOTAL CAPITAL, $/KW(YEAR)	106.9(1972)	140.6(1977)	140.6(1977)
1-6	TOTAL ANNUAL, MILLS/KWH(YEAR)	7.8(1977)	8.6(1977)	8.2(1977)
408.0 MW (NET)	COST ELEMENTS	B,D,F,I,J,M, T,V,X,Y	C,E,I,J,M,S, U,Y	C,E,I,J,M,S, U,Y
INDIANAPOLIS POWER & LIGHT	CAPACITY FACTOR, %	***	65	65
PETERSBURG	TOTAL CAPITAL, $/KW(YEAR)	99.5(1976)	110.6(1977)	110.6(1977)
3	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	6.6(1977)	7.4(1977)
532.0 MW (NET)	COST ELEMENTS	C,F,G,J,M	C,E,G,J,M,S, U,W,Y	C,E,G,J,M,S, U,W,Y
KANSAS CITY POWER & LIGHT	CAPACITY FACTOR, %	14	65	65
HAWTHORN	TOTAL CAPITAL, $/KW(YEAR)	29.0(1972)	87.2(1977)	87.2(1977)
3	TOTAL ANNUAL, MILLS/KWH(YEAR)	8.4(1977)	4.3(1977)	4.4(1977)
90.0 MW (NET)	COST ELEMENTS	B,D,F,T,X	B,C,E,J,K,S, U,W,X	B,C,E,J,K,S, U,W,X
KANSAS CITY POWER & LIGHT	CAPACITY FACTOR, %	***	65	65
HAWTHORN	TOTAL CAPITAL, $/KW(YEAR)	29.0(1972)	87.2(1977)	87.2(1977)
4	TOTAL ANNUAL, MILLS/KWH(YEAR)	8.4(1977)	4.3(1977)	4.4(1977)
90.0 MW (NET)	COST ELEMENTS	B,D,F,T,X	B,C,E,J,K,S, U,W,X	B,C,E,J,K,S, U,W,X
KANSAS CITY POWER & LIGHT	CAPACITY FACTOR, %	42	65	65
LA CYGNE	TOTAL CAPITAL, $/KW(YEAR)	53.6(1972)	68.0(1977)	68.0(1977)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	1.3(1978)	3.8(1977)	3.9(1977)
874.0 MW (NET)	COST ELEMENTS	T	C,E,J,K,S,U	C,E,J,K,S,U
KANSAS POWER & LIGHT	CAPACITY FACTOR, %	***	65	65
JEFFREY	TOTAL CAPITAL, $/KW(YEAR)	56.8(1978)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(1978)	******(0)	******(0)
540.0 MW (NET)	COST ELEMENTS	B,C		
KENTUCKY UTILITIES	CAPACITY FACTOR, %	16	65	65
GREEN RIVER	TOTAL CAPITAL, $/KW(YEAR)	70.3(1975)	77.5(1977)	77.5(1977)
1-3	TOTAL ANNUAL, MILLS/KWH(YEAR)	14.3(1977)	2.7(1977)	5.2(1977)
64.0 MW (NET)	COST ELEMENTS	B,C,E,J,S,U, W	C,E,J,S,U,W	C,E,J,S,U,W

****** INDICATES COST FIGURES NOT YET AVAILABLE

SECTION A-1
COSTS FOR OPERATIONAL FGD SYSTEMS

UNIT DESCRIPTION	COST DESCRIPTION	COST REPORTED	COST ADJUSTED	COST STANDARDIZED ADJUSTED
LOUISVILLE GAS & ELECTRIC	CAPACITY FACTOR, %	55	65	65
CANE RUN	TOTAL CAPITAL, $/KW(YEAR)	66.5(1975)	80.6(1977)	80.6(1977)
4	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.7(1977)	5.8(1977)	6.2(1977)
188.0 MW (NET)	COST ELEMENTS	C,E,H,J,Q,T	C,E,H,J,K,Q, S,U,W	C,E,H,J,K,Q, S,U,W
LOUISVILLE GAS & ELECTRIC	CAPACITY FACTOR, %	***	65	65
CANE RUN	TOTAL CAPITAL, $/KW(YEAR)	62.4(1977)	67.5(1977)	67.5(1977)
5	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	5.6(1977)	5.6(1977)
200.0 MW (NET)	COST ELEMENTS	C,E,H,J	C,E,H,J,K,S, U,W	C,E,H,J,K,S, U,W
LOUISVILLE GAS & ELECTRIC	CAPACITY FACTOR, %	***	65	65
CANE RUN	TOTAL CAPITAL, $/KW(YEAR)	57.9(1977)	******(0)	******(0)
5	TOTAL ANNUAL, MILLS/KWH(YEAR)	3.0(1979)	******(0)	******(0)
299.0 MW (NET)	COST ELEMENTS	C,E,H,M,S,V, W		
LOUISVILLE GAS & ELECTRIC	CAPACITY FACTOR, %	10	65	65
MILL CREEK	TOTAL CAPITAL, $/KW(YEAR)	42.6(1978)	******(0)	******(0)
3	TOTAL ANNUAL, MILLS/KWH(YEAR)	1.3(1978)	******(0)	******(0)
442.0 MW (NET)	COST ELEMENTS	C,S		
LOUISVILLE GAS & ELECTRIC	CAPACITY FACTOR, %	***	65	65
PADDY'S RUN	TOTAL CAPITAL, $/KW(YEAR)	52.8(1973)	76.4(1977)	76.4(1977)
6	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	6.5(1977)	6.4(1977)
72.0 MW (NET)	COST ELEMENTS	C,E	C,E,S,U,W	C.E.S.U.W
MINNKOTA POWER COOPERATIVE	CAPACITY FACTOR, %	***	65	65
MILTON R. YOUNG	TOTAL CAPITAL, $/KW(YEAR)	85.9(1976)	93.0(1977)	93.0(1977)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	5.2(1977)	5.2(1977)
185.0 MW (NET)	COST ELEMENTS	C,E,H,P	C,E,H,M,P,S, U,W	C.E.H.M.P.S. U.W
MONONGAHELA POWER	CAPACITY FACTOR, %	65	65	65
PLEASANTS	TOTAL CAPITAL, $/KW(YEAR)	128.3(1978)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.8(1978)	******(0)	******(0)
618.0 MW (NET)	COST ELEMENTS	B,C,J,S		
MONTANA POWER	CAPACITY FACTOR, %	76	65	65
COLSTRIP	TOTAL CAPITAL, $/KW(YEAR)	77.1(1975)	77.2(1977)	77.2(1977)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	.3(1977)	4.1(1977)	4.1(1977)
360.0 MW (NET)	COST ELEMENTS	B,C,E,J,P,T	C,E,J,K,P,S, U,W	C,E,J,K,P,S, U,W
MONTANA POWER	CAPACITY FACTOR, %	76	65	65
COLSTRIP	TOTAL CAPITAL, $/KW(YEAR)	77.1(1975)	77.2(1977)	77.2(1977)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	.3(1977)	4.1(1977)	4.1(1977)
360.0 MW (NET)	COST ELEMENTS	B,C,E,J,P,T	C,E,J,K,P,S, U,W	C,E,J,K,P,S, U,W
NEVADA POWER	CAPACITY FACTOR, %	67	65	65
REID GARDNER	TOTAL CAPITAL, $/KW(YEAR)	42.9(1973)	60.9(1977)	60.9(1977)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.1(1977)	3.2(1977)	3.4(1977)
125.0 MW (NET)	COST ELEMENTS	B,D,E,P,S,U, W,X	B,D,E,P,S,U, W,X	B,D,E,P,S,U, W,X

****** INDICATES COST FIGURES NOT YET AVAILABLE

SECTION A-1
COSTS FOR OPERATIONAL FGD SYSTEMS

UNIT DESCRIPTION	COST DESCRIPTION	COST REPORTED	 ADJUSTED	 STANDARDIZED ADJUSTED
NEVADA POWER	CAPACITY FACTOR, %	67	65	65
REID GARDNER	TOTAL CAPITAL, $/KW(YEAR)	42.9(1973)	60.9(1977)	60.9(1977)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.1(1977)	3.2(1977)	3.4(1977)
125.0 MW (NET)	COST ELEMENTS	B,D,E,P,S,U, W,X	B,D,E,P,S,U, W,X	B,D,E,P,S,U, W,X
NEVADA POWER	CAPACITY FACTOR, %	67	65	65
REID GARDNER	TOTAL CAPITAL, $/KW(YEAR)	113.6(1975)	107.9(1977)	107.9(1977)
3	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.1(1977)	4.4(1977)	5.0(1977)
125.0 MW (NET)	COST ELEMENTS	B,C,E,L,S,U, W,X	B,C,E,L,S,U, W,X	B,C,E,L,S,U, W,X
NORTHERN INDIANA PUB SERVICE	CAPACITY FACTOR, %	77	65	65
DEAN H. MITCHELL	TOTAL CAPITAL, $/KW(YEAR)	156.9(1976)	134.8(1977)	134.8(1977)
11	TOTAL ANNUAL, MILLS/KWH(YEAR)	14.9(1976)	12.4(1977)	11.0(1977)
115.0 MW (NET)	COST ELEMENTS	B,C,E,L,N,S, U,W,X,Z	C,E,L,N,S,U, W,Z	C,E,L,N,S,U, W,Z
NORTHERN STATES POWER	CAPACITY FACTOR, %	73	65	65
SHERBURNE	TOTAL CAPITAL, $/KW(YEAR)	47.9(1972)	71.2(1977)	71.2(1977)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.0(1977)	2.8(1977)	3.3(1977)
740.0 MW (NET)	COST ELEMENTS	B,C,J,S,U,X, Z	C,E,J,K,S,U, W	C,E,J,K,S,U, W
NORTHERN STATES POWER	CAPACITY FACTOR, %	73	65	65
SHERBURNE	TOTAL CAPITAL, $/KW(YEAR)	47.9(1972)	71.2(1977)	71.2(1977)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.0(1977)	2.8(1977)	3.3(1977)
740.0 MW (NET)	COST ELEMENTS	B,C,J,S,U,X, Z	C,E,J,K,S,U, W	C,E,J,K,S,U, W
PACIFIC POWER & LIGHT	CAPACITY FACTOR, %	***	65	65
JIM BRIDGER	TOTAL CAPITAL, $/KW(YEAR)	120.0(1979)	******(0)	******(0)
4	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
550.0 MW (NET)	COST ELEMENTS	C,E,J		
PENNSYLVANIA POWER	CAPACITY FACTOR, %	40	65	65
BRUCE MANSFIELD	TOTAL CAPITAL, $/KW(YEAR)	120.6(1975)	102.1(1977)	102.1(1977)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	14.3(1977)	8.7(1977)	10.8(1977)
917.0 MW (NET)	COST ELEMENTS	B,C,E,G,I,L, S,U,W,X	C,E,G,I,M,S, U,W	C,E,G,I,M,S, U,W
PENNSYLVANIA POWER	CAPACITY FACTOR, %	40	65	65
BRUCE MANSFIELD	TOTAL CAPITAL, $/KW(YEAR)	120.6(1975)	102.1(1977)	102.1(1977)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	14.3(1977)	8.7(1977)	10.8(1977)
917.0 MW (NET)	COST ELEMENTS	B,C,E,G,I,L, S,U,W,X	C,E,G,I,M,S, U,W	C,E,G,I,M,S, U,W
PUBLIC SERVICE OF NEW MEXICO	CAPACITY FACTOR, %	***	65	65
SAN JUAN	TOTAL CAPITAL, $/KW(YEAR)	127.9(1977)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
361.0 MW (NET)	COST ELEMENTS	A,C,E,N		
PUBLIC SERVICE OF NEW MEXICO	CAPACITY FACTOR, %	***	65	65
SAN JUAN	TOTAL CAPITAL, $/KW(YEAR)	127.9(1977)	******(0)	******(0)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
350.0 MW (NET)	COST ELEMENTS	A,C,E,N		

****** INDICATES COST FIGURES NOT YET AVAILABLE

SECTION A-1
COSTS FOR OPERATIONAL FGD SYSTEMS

UNIT DESCRIPTION	COST DESCRIPTION	COST REPORTED	COST ADJUSTED	COST STANDARDIZED ADJUSTED
SALT RIVER PROJECT	CAPACITY FACTOR, %	***	65	65
CORONADO	TOTAL CAPITAL, $/KW(YEAR)	74.0(1978)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
280.0 MW (NET)	COST ELEMENTS	C,E		
SOUTH CAROLINA PUBLIC SERVICE	CAPACITY FACTOR, %	80	65	65
WINYAH	TOTAL CAPITAL, $/KW(YEAR)	47.4(1976)	66.4(1977)	66.4(1977)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	1.6(1975)	2.9(1977)	3.2(1977)
140.0 MW (NET)	COST ELEMENTS	C,F,J,M,S,V	C,E,J,K,M,S,U,W	C,E,J,K,M,S,U,W
SOUTH MISSISSIPPI ELEC PWR	CAPACITY FACTOR, %	***	65	65
R.D. MORROW	TOTAL CAPITAL, $/KW(YEAR)	37.4(1975)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
124.0 MW (NET)	COST ELEMENTS	C,E		
SOUTH MISSISSIPPI ELEC PWR	CAPACITY FACTOR, %	***	65	65
R.D. MORROW	TOTAL CAPITAL, $/KW(YEAR)	37.4(1975)	******(0)	******(0)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
124.0 MW (NET)	COST ELEMENTS	C,E		
SOUTHERN ILLINOIS POWER COOP	CAPACITY FACTOR, %	65	65	65
MARION	TOTAL CAPITAL, $/KW(YEAR)	152.7(1978)	******(0)	******(0)
4	TOTAL ANNUAL, MILLS/KWH(YEAR)	1.8(1978)	******(0)	******(0)
184.0 MW (NET)	COST ELEMENTS	B,C,T,X		
SOUTHERN INDIANA GAS & ELEC	CAPACITY FACTOR, %	***	65	65
A.B. BROWN	TOTAL CAPITAL, $/KW(YEAR)	43.0(1979)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
265.0 MW (NET)	COST ELEMENTS	C,E,G		
SPRINGFIELD CITY UTILITIES	CAPACITY FACTOR, %	***	65	65
SOUTHWEST	TOTAL CAPITAL, $/KW(YEAR)	77.3(1974)	117.6(1977)	117.6(1977)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	6.2(1977)	6.9(1977)
194.0 MW (NET)	COST ELEMENTS	C,F,H,J,P	C,E,H,J,K,P,S,U,W	C,E,H,J,K,P,S,U,W
TENNESSEE VALLEY AUTHORITY	CAPACITY FACTOR, %	60	65	65
WIDOWS CREEK	TOTAL CAPITAL, $/KW(YEAR)	98.1(1976)	113.1(1977)	113.1(1977)
8	TOTAL ANNUAL, MILLS/KWH(YEAR)	3.0(1977)	5.3(1977)	5.1(1977)
550.0 MW (NET)	COST ELEMENTS	B,C,E,P,R,T,U	C,E,J,S,U,W	C,E,J,S,U,W
UTAH POWER & LIGHT	CAPACITY FACTOR, %	65	65	65
HUNTER	TOTAL CAPITAL, $/KW(YEAR)	91.1(1978)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	.1(1978)	******(0)	******(0)
360.0 MW (NET)	COST ELEMENTS	B,C,T,X		
UTAH POWER & LIGHT	CAPACITY FACTOR, %	80	65	65
HUNTINGTON	TOTAL CAPITAL, $/KW(YEAR)	85.9(1978)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	1.4(1978)	******(0)	******(0)
366.0 MW (NET)	COST ELEMENTS	B,C,T,X		

****** INDICATES COST FIGURES NOT YET AVAILABLE

SECTION A-2
COSTS FOR NON-OPERATIONAL FGD SYSTEMS

UNIT DESCRIPTION	COST DESCRIPTION	COST REPORTED	ADJUSTED	STANDARDIZED ADJUSTED
BASIN ELECTRIC POWER COOP	CAPACITY FACTOR, %	***	65	65
LARAMIE RIVER	TOTAL CAPITAL, $/KW(YEAR)	56.0(1980)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	.9(7800)	******(0)	******(0)
570.0 MW (NET)	COST ELEMENTS	C,E		
BASIN ELECTRIC POWER COOP	CAPACITY FACTOR, %	***	65	65
LARAMIE RIVER	TOTAL CAPITAL, $/KW(YEAR)	56.0(1980)	******(0)	******(0)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	.9(7800)	******(0)	******(0)
570.0 MW (NET)	COST ELEMENTS	C,E		
BOSTON EDISON	CAPACITY FACTOR, %	***	65	65
MYSTIC	TOTAL CAPITAL, $/KW(YEAR)	63.4(1972)	******(0)	******(0)
5	TOTAL ANNUAL, MILLS/KWH(YEAR)	3.0(1974)	******(0)	******(0)
150.0 MW (NET)	COST ELEMENTS	B,C,E,N,G		
COLORADO UTE ELECTRIC ASSN.	CAPACITY FACTOR, %	***	65	65
CRAIG	TOTAL CAPITAL, $/KW(YEAR)	86.5(1979)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
447.0 MW (NET)	COST ELEMENTS	B,D,E		
ILLINOIS POWER COMPANY	CAPACITY FACTOR, %	***	65	65
WOOD RIVER	TOTAL CAPITAL, $/KW(YEAR)	82.5(1972)	******(0)	******(0)
4	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
110.0 MW (NET)	COST ELEMENTS	A,C,E,M,N		
PHILADELPHIA ELECTRIC	CAPACITY FACTOR, %	***	65	65
EDDYSTONE	TOTAL CAPITAL, $/KW(YEAR)	156.7(1972)	233.2(1977)	233.2(1977)
1A	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.0(1972)	13.0(1977)	12.4(1977)
120.0 MW (NET)	COST ELEMENTS	D,F,N,P	C,E,N,P	C,E,N,P
SALT RIVER PROJECT	CAPACITY FACTOR, %	***	65	65
CORONADO	TOTAL CAPITAL, $/KW(YEAR)	74.0(1978)	******(0)	******(0)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
280.0 MW (NET)	COST ELEMENTS	C,E		

****** INDICATES COST FIGURES NOT YET AVAILABLE

APPENDIX B

DEFINITIONS

DEFINITIONS

Boiler Commercial Service Date	Date when boiler and auxiliary equipment (including FGD system for new boilers) has met initial supplier guarantees and begins to contribute electrical power to the power grid.
Byproduct	The nature (e.g. elemental sulfur, sulfuric acid) and disposition (e.g. stockpile on site, marketed) of the end product by systems that generate a saleable product.
Commercial Service Date (FGD System)	Date when the FGD system successfully completes compliance testing and the utility is satisfied that the system meets supplier contractual guarantees.
Company Name	Name of corporation as it appears in Electrical World - Directory of Electrical Utilities, McGraw-Hill - Current Edition - as space permits.
Disposal	Disposal method for throwaway product systems producing sludge including: stabilized or unstabilized sludge, interim and final disposal sites and disposal type (minefill, landfill, etc.) as well as disposal location.
Efficiency: Particulate Matter	The actual percentage of particulate matter removed by the emission control system (mechanical collectors, ESP, or fabric filter and FGD) from the untreated flue gas.
SO_2	The actual percentage of SO_2 removed from the flue gas by the FGD system.

FGD Viability Indexes

Several parameters have been developed to quantify the viability of FGD system technology. Various terms such as "availability," "reliability," "operability," and "utilization" are used to accurately represent the operation of any FGD system during a given period. The above-mentioned parameters are defined below and discussed briefly. The objectives of this discussion are to make the reader aware that several different definitions are being used and to select appropriate parameters that can be used for reporting purposes so that reasonably consistent comparisons can be made.

Availability Index

Hours the FGD system is available for operation (whether operated or not) divided by hours in period, expressed as a percentage. This parameter tends to overestimate the viability of the FGD system because it does not penalize for election not to operate the system when it could have been operated. Boiler downtime may tend to increase the magnitude of the parameter because FGD failures generally cannot occur during such periods.

Reliability Index

Hours the FGD system was operated divided by the hours the FGD system was called upon to operate, expressed as a percentage. This parameter has been developed in order not to penalize the FGD system for elected outages, e.g., periods when the FGD system could have been run but was not run because of chemical shortages, lack of manpower, short duration boiler operations, etc. The main problem in using this

	formula is the concise determination whether or not the system was "called upon to operate" during a given time period. In addition, an undefined value can result when the FGD system is not called upon to operate for a given period (e.g., turbine or boiler outage when FGD system is available).
FGD Operability Index	Hours the FGD system was operated divided by boiler operating hours in period, expressed as a percentage. This parameter indicates the degree to which the FGD system is actually used, relative to boiler operating time. The parameter is penalized when options are exercised not to use the FGD system in periods when the system is operable. In addition, an undefined value can result when the FGD system is not called upon to operate for a given period (e.g., turbine or boiler outage when FGD system is available).
FGD Utilization Index	Hours that the FGD system operated divided by total hours in period. This parameter is a relative stress factor for the FGD system. It is not a complete measure of FGD system viability because the parameter can be strongly influenced by conditions that are external to the FGD system (e.g., infrequent boiler operation will lower the value of the parameter although the FGD system may be highly dependable in its particular application).
End Product	
Saleable	The SO_2 removed from the flue gas is recovered in a usable or marketable form (e.g., sulfur, sulfuric acid, gypsum,

	ammonium sulfate, sodium sulfate).
Throwaway	The SO_2 removed from the flue gas is not recovered in a usable or marketable form and resulting sulfur-bearing waste products must be disposed in an environmentally acceptable fashion.
Energy Consumption, %	The percentage of gross unit electrical generating capacity consumed by the FGD system, as defined by the following equation: [Net MW w/o FGD - Net MW w/FGD]/Gross unit rating]
Equivalent Scrubbed Capacity (ESC)	The effective scrubbed flue gas in equivalent MW based on the percent of flue gas scrubbed by the FGD system.
FGD Status:	
Category 1	Operational - FGD system is in service removing SO_2.
Category 2	Under construction - ground has been broken for installation of FGD system, but FGD system has not become operational.
Category 3	Planned, Contract Awarded - contract has been signed for purchase of FGD system but ground has not been broken for installation.
Cateogry 4	Planned, Letter of Intent Signed - letter of intent has been signed, but legal contract for purchase has not been awarded.
Category 5	Planned, Requesting/Evaluating Bids - bid requests have been released but no letter of intent or contract has been issued.

Category 6	Considering only FGD Systems - an FGD system is proposed as a means to meet an SO_2 regulation.
Category 7	Considering an FGD system as well as alternative methods.
Category 8	Nonoperational - FGD system has been operated in the past but has been shut down permanently or for an extended indefinite period of time.
Fuel Firing Rate - TPH	Boiler fuel firing rate in terms of tons per hour at maximum continuous load.
General Process Type	The manner in which the SO_2 from the flue gas is collected, e.g., wet scrubbing, spray drying, dry adsorption.
Initial Start-Up (FGD System)	Date when flue gas first passes through any component of the FGD system (or is scheduled to do so).
New	FGD unit and boiler were designed at the same time or space for addition of an FGD unit was reserved when boiler was constructed.
Plant Name	Unit identification as it appears in Electrical World - Directory of Electrical Utilities, McGraw-Hill - Current Edition - or as indicated by utility representative for installations in planning stages.
Process Additives	A chemical compound or element which is added to the process or normally found with the main process reagent in small quantities (e.g., Mg, adipic acid) to promote improved process operation (e.g., scale reduction, increased SO_2 removal efficiency).

Process Type	Company name if process is patented. Generic name if several companies have similar processes (e.g., Lime, Limestone, Wellman Lord, Thoroughbred 121).
Regulatory Class	A. New boiler constructed subject to Federal New Source Performance Standards (NSPS), 8/17/71. B. Existing boiler subject to State Standard that is more stringent than the NSPS, 8/17/71. C. Existing boiler subject to State Standard that is equal to or less stringent than NSPS, 8/17/71. D. Other (unknown, undetermined).
Retrofit	FGD unit will be/was added to an existing boiler not specifically designed to accommodate FGD unit.
Spare Capacity Index - %	The summation of the individual component capacities (%) minus 100%.
Spare Component Index	The equipment spare capacity index (%) divided by the individual component capacity (%).
System Supplier	A firm that fabricates and supplies flue gas desulfurization systems.
Total Controlled Capacity (TCC)	The gross rating (MW) of a unit brought into compliance with FGD, regardless of the percent of flue gas treated at the facility. In the case of prototype and demonstration FGD systems, this figure will be identical to the Equivalent Scrubbed Capacity rather than

	the gross unit rating if the system is not meant to bring the facility into compliance with SO_2 emission standards.
Unit Rating	
Gross	Operational - Maximum continuous gross generation capacity in MW; Preoperational - maximum continuous design generation capacity in MW.
New w/FGD	Gross unit rating less the energy required to operate ancillary station equipment, inclusive of emission control systems.
Net w/o FGD	Gross unit rating less the energy required to operate ancillary station equipment, exclusive of emission control systems.

APPENDIX C

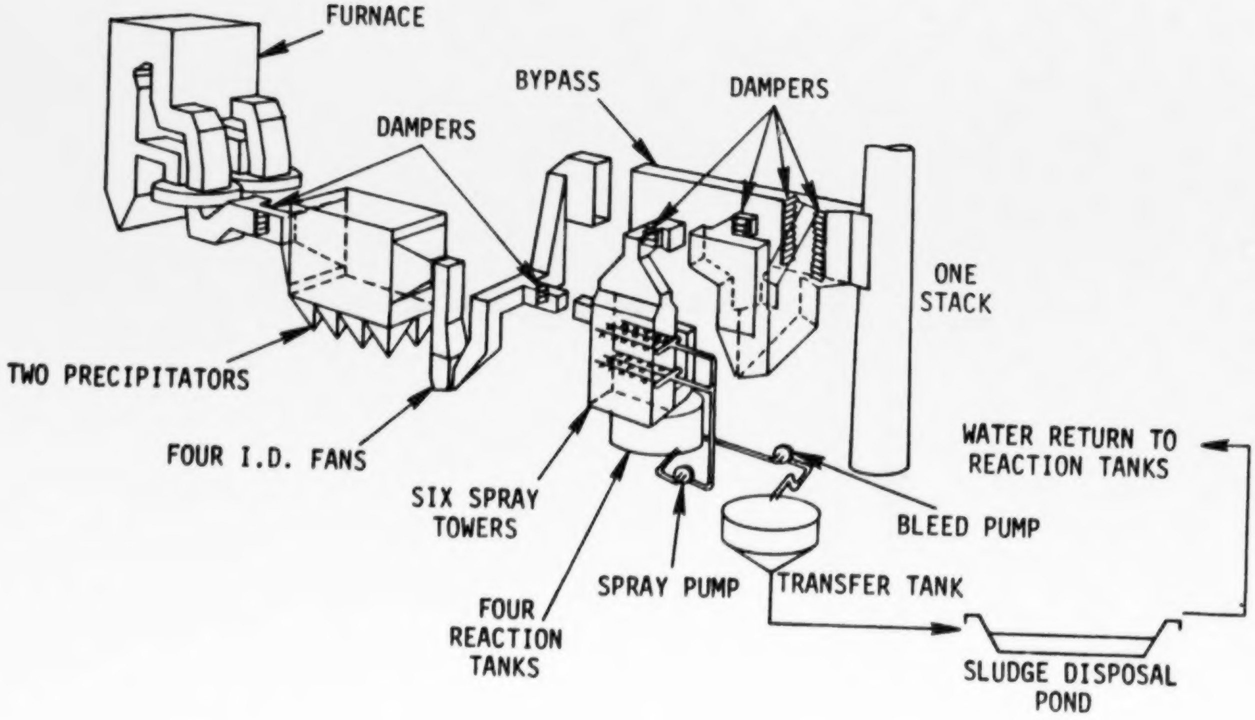
TABLE OF UNIT NOTATION

TABLE OF UNIT NOTATION

Classification	English Unit	Symbol	Survey Report Notation	ASTM/SI Unit	Symbol	Survey Report Notation
Area	Acre	acre	ACRE	Square meter	M^2	SQ.M
	Square foot	ft^2	SQ.FT	Square meter	M^2	SQ.M
Concentration	Grains per standard cubic foot	gr/scf	GR/SCF	Grams per cubic meter	g/m^3	G/CU.M
	Parts per million	ppm	PPM	Parts per million	ppm	PPM
	Pounds per million Btu	$lb/10^6$ Btu	LB/MMBTU	Nanograms per joule	ng/J	NG/J
Flow	Actual cubic feet per minute	ft^3/min (actual)	ACFM	Cubic meters per second	m^3/s	CU.M/S
	Gallons per minute	gal/min	GPM	Liters per second	liter/s	LITER/S
	Pounds per minute	lb/min	LB/MIN	Kilogram per second	kg/s	KG/S
	Ton per day	t/day	TPD	Metric ton per day	M t/d	M T/D
	Ton per hour	t/h	TPH	Metric ton per hour	M t/h	M T/H
Heat Content	Btu per pound	Btu/lb	BTU/LB	Joules per gram	J/q	J/G
Length	Foot	ft	FT	Meter	m	M
	Inch	in	IN	Centimeter	cm	CM
	Mile	mi	MI	Kilometer	km	KM
L/G Ratio	Gallons per thousand actual cubic feet	gal/1000 ft^3 (actual)	GAL/1000ACF	Liters per cubic meter	liter/m^3	LITER/CU.M
Mass/Weight	Pound	lb	LB	Kilogram	kg	KG
	Ton	t	T	Megagram	Mg	MG
Pressure	Inches of water	in. H_2O	IN. H_2O	Kilopascal	kPa	KPA
Temperature	Degree Fahrenheit	°F	F	Degree Celsius	°C	C
Volume	Cubic feet	ft^3	CU.F	Cubic meter	m^3	CU.M
	Acre-feet	Acre-ft	ACRE-FT	Cubic meter	m^3	CU.M

APPENDIX D

FGD PROCESS FLOW DIAGRAMS



Kansas Power and Light,
Schematic of Jeffrey Steam Generator and Emission Control Equipment